Linking emissions trading systems

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A Law and Economics Analysis

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A Law and Economics Analysis

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To Bogie and Wondwossen (Mamush)

Paranymphs

Lucía Berro Pizzarossa

Yingying Zeng

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Acronyms

AAU	Assigned Amount Unit
ACCU	Australian Carbon Credit Unit
ACU	Australian Carbon Unit
CARB	The California Air Resource Board
CCA	Climate Change Authority (Australia)
CCC	Committee on Climate Change (UK)
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CFI	Carbon Farming Initiative (Australia)
CH_4	Methane
CO_2	Carbon dioxide
COP	Conference of the Parties
CPM	Carbon Pricing Mechanism (Australia)
CPRS	Carbon Pollution Reduction Scheme (Australia)
EITE	Emissions-Intensive Trade-Exposed
EPAC	Emission Permits Allocation Committee (Korea)
ERU	Emission Reduction Unit
ETS	Emissions Trading System, Emissions Trading Scheme
EU	European Union
EUA	European Union Allowance
GHG	Greenhouse gas
HFC	Hydrofluorocarbon
ICAP	International Carbon Action Partnership

IETA	International Emission Trading Association
IPCC	Intergovernmental Panel on Climate Change
ITMO	Internationally transferred mitigation outcome
JCP	Jobs and Competitiveness Program (Australia)
lCER	Long-term Certified Emission Reduction
LDC	Least Developed Country
LULUCF	Land use, land-use change and forestry
MAC	Marginal abatement Cost
MB	Marginal Benefit of abatement
MRV	Monitoring, reporting and verification
MSR	Market Stability Reserve (EU)
N_2O	Nitrous oxide
NCM	Networked Carbon Markets
NDC	Nationally Determined Contribution
NZU	New Zealand Unit
OECD	Organisation for Economic Cooperation and Development
RGGI	Regional Greenhouse Gas Initiative
RU	Removal Unit
SO_2	Sulphur dioxide
tCER	Temporary Certified Emission Reduction
UK	United Kingdom
UNFCCC	United National Framework Convention on Climate Change
US	United States

1
Introduction

The past decade saw the proliferation of emissions trading as a mechanism of internalising the external costs of pollution.[1] Since the European Union (EU) launched the world's largest emissions trading system (ETS) in 2005, the number of ETSs in force has risen to 18 by 2017.[2] Seventeen ETSs in 14 countries are either scheduled to commence or are under consideration.[3] With the rise in the number of ETSs in regions as diverse as Europe, North America, Asia-Pacific and Latin America, linking ETSs has been gaining traction since the early 2000s.[4] Linking ETSs establishes inter-system trading in emissions rights between the linking-partner ETSs and allocates emissions abatement to wherever it could be achieved

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1 Emissions trading, permit trading, and cap-and-trade are used interchangeably throughout the dissertation. This need not imply that each is a perfect substitute for the other. For instance, cap-and-trade implies an *ex ante* fixed cap on the quantity of greenhouse gas emissions that regulated entities could emit in a given compliance period, while emissions trading is often employed as an umbrella concept covering systems with or without a fixed cap. See E Woerdman, Tradable Emissions Rights, in JG Backhaus (ed), *The Elgar Companion to Law and Economics* (Edward Elgar 2005) 366-368; SE Weishaar, 'CO_2 Emission Allocation Mechanisms, Allocative Efficiency and the Environment: A Static and Dynamic Perspective' (2007) 24 European Journal of Law and Economics 29, 36-38. If 'emissions trading system' is used to denote a system without a fixed cap, it will be explicitly stated.

2 International Carbon Action Partnership (ICAP), 'Emissions Trading Worldwide: International Carbon Action Partnership Status Report 2016' (ICAP 2016) 25. See also A Kossoy and others, *State and Trends of Carbon Pricing 2015* (World Bank 2015) 40-47.

3 ICAP (n 2) 25.

4 See generally G Gruell and L Taschini, 'Linking Emission Trading Schemes' [2012] Economics of Energy & Environmental Policy 31.

at the least possible abatement cost.[5] This dissertation assesses, following a law and economics perspective, how linking ETSs with different design features could affect cost- and environmental effectiveness of the resulting carbon market.

This introductory Chapter is organised as follows. Sections 1.1 and 1.2 aim to provide a background to the remainder of the analysis by describing, respectively, alternative instruments of climate change policy and the history of linking. Section 1.3 introduces the research questions that the dissertation attempts to address. Methodological and research design issues are addressed in Section 1.4. Section 1.5 explains the Law and Economics theoretical framework applied in the research. Section 1.6 provides a road map of the dissertation.

1.1. Pricing carbon

The Intergovernmental Panel on Climate Change (IPCC) concludes in its latest assessment that anthropogenic greenhouse gas (GHG) emissions are 'extremely likely' to have been 'the dominant cause' of the observed warming since the mid-20th century.[6] Between 1750 and 2011, human activity added 2040 (± 310) Gigatons of GHG emissions, about half of which in the last 40 years alone.[7] If humanity chooses to continue down this emissions trajectory, the consequences are predicted to be grave. The mean global temperature will likely increase above 4 degrees Celsius above pre-industrial levels by 2100, leading to 'high to very high risk of severe, widespread and irreversible impacts globally' such as substantial species extinction, and global and regional food insecurity.[8]

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5 The emissions rights that allow regulated entities to emit a specified quantity of GHG emissions in a given compliance period are variously called 'tradable permits', 'pollution permits' or 'emissions allowances'. In this dissertation, they are used interchangeably.

6 Core Writing Team, RK Pachauri and LA Meyer (eds), *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC 2015) 4. The IPCC uses different qualifiers to describe the assessed likelihood of an outcome or a result. These range from 'virtually certain' (99–100% probability) to 'exceptionally unlikely' (0–1% probability). 'Extremely likely' represents 95–100% probability. In other words, there is a 95-100% probability that climate change is predominantly caused by anthropogenic GHG emissions. For more details on expressions of qualified uncertainty, see MD Mastrandrea and others, 'Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties' (IPCC 2010) <https://www.ipcc.ch/pdf/supporting-material/uncertainty-guidance-note.pdf> accessed 29 December 2016.

7 Core Writing Team, Pachauri and Meyer (n 6) 4.

8 Core Writing Team, Pachauri and Meyer (n 6) 18-19.

Economic theory characterises GHG emissions as a negative externality – unintended and uncompensated consequences of economic actors' production and consumption decisions.[9] Whereas GHG emissions impose a cost on society, economic actors do not consider the full cost of their pollution when they decide how much to produce or consume, creating a divergence between private net benefits and social costs. The result is a market equilibrium that fails to maximise social welfare and a level of pollution that is more than optimal. Because it is too costly for individual actors to negotiate an optimum level of pollution, short-term gains dominate rational actors' decision-making. Actions that are rational from a self-interested perspective lead to overexploitation of the common-pool resource, resulting in what Hardin called 'the tragedy of the commons'.[10]

However, climate change is, as Stern puts it, 'an externality with a difference'.[11] First, it is global in both its causes and consequences. Addressing climate change thus requires a globally concerted action. Second, because GHGs remain in the atmosphere for a significant amount of time, the impact of climate change is persistent and develops over time. Third, given its long-term consequences, there are considerable uncertainties relating to the timing, size, and types of impacts of climate change and the costs of climate change mitigation. Finally, absent timely action, climate change will have non-marginal consequences to humanity.

The externality problem can be addressed in one of two ways.[12] The government can specify 'command-and-control' instruments, requiring regulated entities to meet absolute emissions reduction targets over a specified period, or imposing technology-

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9 RH Frank and BS Bernanke, *Principles of Economics* (5th edn, McGraw-Hill/Irwin 2013) 280-283.

10 G Hardin, 'The Tragedy of the Commons' (1968) 162 Science 1243. See also GD Libecap, 'State Regulation of Open-Access, Common-Pool Resources' in C Menard and MM Shirley (eds), *Handbook of New Institutional Economics* (Springer 2005).

11 N Stern, *The Economics of Climate Change: The Stern Review* (Cambridge University Press 2007) 23-25.

12 Surely, this is an oversimplification of institutional arrangements that could be used to address the externality problem. The various institutions that aim to protect a common-pool resource could come in different forms including government ownership of the resource, privatisation of the resource, and ownership of the resource by a community. See T Dietz and others, 'The Drama of the Commons' in E Ostrom and others (eds) *The Drama of the Commons* (National Academies Press 2002) 18. For a discussion on instrument choice in climate policy, see C Hepburn, 'Regulation by Prices, Quantities or Both: A Review of Instrument Choice' (2006) 22 Oxford Review of Economic Policy 226; M Faure and SE Weishaar, 'The Role of Environmental Taxation: Economics and the Law' in JE Milne and MS Anderson (eds), *Handbook of Research on Environmental Taxation* (Edward Elgar 2012).

based or performance standards.[13] Command-and-control instruments are often considered as crude instruments that impose pollution reduction commitments with little regard to individual firms' marginal abatement cost (MAC), which is private to the regulated entities.[14] A second way is to use market-based instruments such as pollution taxes and permit trading systems. These could optimally allocate abatement between polluters without requiring detailed information about firms' MAC.[15]

Arthur Pigou (1877-1959) proposed levying a tax that is ideally equal to the social cost of an activity with negative externalities.[16] The tax shifts up polluting firms' private marginal cost curve and equalises it with the social marginal cost curve, leading to a socially optimum equilibrium. In general, *Pigovian* taxes are more efficient than command-and-control instruments because firms facing a higher MAC than the tax will continue to pollute (and pay the tax) while firms with a lower MAC than the tax will reduce emissions substantially and avoid paying the tax. In equilibrium, the tax equalises MACs of regulated firms, leading to an efficient pollution reduction.[17]

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[13] See, for instance, A Ogus, 'Regulatory Institutions and Structures' (2002) 73 Annals of Public and Cooperative Economics 627, 632-633. See also IA Moosa and V Ramiah, *The Costs and Benefits of Environmental Regulation* (Edward Elgar 2014) 12-14.

[14] See, for instance, B Ackerman and RB Stewart, 'Reforming Environmental Law: The Democratic Case for Market Incentives' (1988) 13 Columbia Journal of Environmental Law 171; A Ogus, *Regulation: Legal Form and Economic Theory* (Hart Publishing 2004) 204-205. See also SE Weishaar, *Towards Auctioning: The Transformation of the European Greenhouse Gas Emissions Trading System. Present and Future Challenges to Competition Law* (Kluwer Law International 2009) 32-33.

[15] See generally T Tietenberg, 'Economic Instruments for Environmental Regulation' in DR Helm (ed) *Economic Policy towards the Environment* (Blackwell 1991). As Faure cautions, however, one needs to be careful in comparing command-and-control instruments and market-based instruments because 'the superiority of the one or the other is very much dependent upon the specific context, type of pollutant regulated, institutional design, etc.' See M Faure, 'Effectiveness of Environmental Law: What Does the Evidence Tell Us?' (2012) 36 William & Mary Environmental Law and Policy Review 293, 309. See also RW Hahn and RN Stavins, 'Economic Incentives for Environmental Protection: Integrating Theory and Practice' (1992) 82 The American Economic Review 464. For instance, Cole and Grossman showed that command-and-control instruments could be more efficient than market-based approaches when, for instance, monitoring costs are very high. See DH Cole and PZ Grossman, 'When is Command-and-Control Efficient? Institutions, Technology, and the Comparative Efficiency of Alternative Regulatory Regimes for Environmental Protection' (1999) Wisconsin Law Review 887.

[16] A Pigou, *The Economics of Welfare* (Macmillan and Co. 1932).

[17] WJ Baumol and WE Oates, *The Theory of Environmental Policy* (2nd edn, Cambridge University Press

A typical cap-and-trade system consists of, at the bare minimum, a cap, an allocation system, and tradable emissions allowances.[18] The cap determines the quantity of GHGs that regulated entities can emit over a compliance period. The cap is then rationed among regulated entities through an allocation system. Regulated entities are required to surrender an allowance for every unit of GHG emissions they have put into the atmosphere over a compliance period. Because allowances are transferable, they move toward those users that value them the most. Given the scarcity created by the cap, each regulated entity has an incentive to reduce its emissions until, at the margin, its cost of abatement equals the market allowance price. Since firms' MAC vary, firms with lower MAC have the incentive to reduce more emissions than those with higher MAC. The transferability of emissions allowances allows firms with lower MAC to sell 'spare' allowances to those with higher MAC. In equilibrium, the trade equalises the firms' MAC, reaching the aggregate emissions target at the least possible abatement cost.

In an ideal world, where costs and benefits of abatement are certain, price instruments (such as a carbon tax) and quantity instruments (such as a cap-and-trade system) are equally efficient.[19] A permit trading system could be designed to deliver an allowance price that is equal to the level of an optimum tax. Similarly, a tax could be set in such a way to achieve a given quantity of GHG emissions that is equal to the optimum level of the cap under a permit trading system. Under more realistic settings, however, neither costs of abatement nor benefits of abatement are entirely certain.[20]

Under conditions of uncertain abatement costs, Weitzman demonstrated that the fundamental symmetry between price and quantity instruments breaks down, and that each instrument imposes a dead-weight loss on society.[21] The magnitude of the welfare loss, however, differs from one instrument to the other depending on the

1988) 42-50; Weishaar, *Towards Auctioning* (n 14) 30-31.

18 R Perman and others, *Natural Resource and Environmental Economics* (3rd edn, Pearson 2003) 224-227.

19 M Weitzman, 'Prices vs. Quantities' (1974) 41 Review of Economic Studies 477, 480; Baumol and Oates (n 17) 58-60.

20 J Meckling and C Hepburn, 'Economic Instruments for Climate Change' in R Falkner (ed), *The Handbook of Global Climate and Environment Policy* (Wiley-Blackwell 2013), 470.

21 Weitzman (n 19) 80-82.

slope of the MAC curve relative to the marginal benefit of abatement (MB) curve.[22] Price instruments are preferred if the MAC curve slopes steeper than the MB curve, and that quantity instruments are favoured if the MAC curve slopes flatter than the MB curve.[23]

A relatively steep MAC curve implies that the cost of reducing an additional tonne of GHG emission increases very quickly while the marginal benefits of the pollution abatement are reasonably constant. Assuming a relatively steep MAC curve, if the regulator wrongly sets a quantity target that is too tight, regulated entities face an unreasonably high cost of abatement relative to the benefit of the abatement. The regulator could reduce the welfare loss by using price instruments because regulated entities will abate and avoid the high pollution tax as long as their real abatement cost function lies below the pollution tax. On the other hand, a relatively steep MB curve implies the marginal damage caused by an additional tonne of GHG emission increases very steeply, relative to the cost of reducing the tonne of GHG emission. In such cases, setting a wrong quantity target is less costly than setting an incorrect price.

Weitzman's analysis implies that price instruments are preferred (over quantity instruments) to fight climate change.[24] As a stock externality, the consequences of

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22 See, generally, Weitzman (n 19); Hepburn, 'Regulation by Prices, Quantities or Both' (n 12) 231-233.

23 Price and quantity instruments can usefully be combined to form a hybrid instrument. Hybrid instruments could, under some conditions, be more efficient than pure quantity or pure price instruments. The classic work in this area is by MJ Roberts and M Spence, 'Effluent Charges and Licenses under Uncertainty' (1976) 5 Journal of Public Economics 193.

24 The conclusion that price instruments are more efficient than quantity instruments under uncertainty assumes away uncertainty concerning marginal benefits of abatement. However, MB of abatement are anything but certain, not least because climate change has a very long-time horizon. See WA Pizer, 'Combining Price and Quantity Controls to Mitigate Global Climate Change' (2002) 85 Journal of Public Economics 409, 416. If the uncertainties concerning both MB and MAC are taken into account in analysing the relative efficiency of price and quantity instruments, a different conclusion may emerge. For instance, if the MC and MB curves are positively correlated, quantity instruments will be preferred over price instruments. Hepburn, 'Regulation by Prices, Quantities or Both' (n 12) 232. Also, Weitzman's primary outcome does not take into account the possibility of 'tipping points' that may take the climate system from one state into another irreversible state. The IPCC's latest assessment confirms that as temperature rises 'some physical and ecological systems are at risk of abrupt and/or irreversible changes.' Core Writing Team, Pachauri and Meyer (n 6) 72. The potential for irreversible damage from GHG emissions lends support for fixing the quantity of GHG emissions rather than prices. If the amount of GHG emissions is left uncertain through a price instrument, we may face consequences that cannot be reversed by adjusting a too low carbon price

climate change depend on the accumulated *stock* of GHG emissions over time (in contradistinction to the flow of GHG emissions over a given period such as a year).[25] The flow of pollutants over a short period is unlikely to make a big difference. The marginal benefit of reducing the flow of GHG emissions is relatively small and does not increase steeply as GHG emissions come down, suggesting a relatively flat MB curve. On the other hand, the costs of GHG abatement may rapidly increase as one moves from cheap 'low hanging fruits' to more expensive forms of abatement, indicating a relatively steep MAC curve.[26]

Whereas efficiency analysis favours price instruments, efficiency is but one consideration in choosing between climate policy instruments. Meckling and Hepburn, for instance, discuss other factors that might tip the balance towards quantity instruments.[27] First, quantity instruments are environmentally effective in that they achieve an intended environmental target. Second, they are likely to be more durable and flexible than price instruments. Third, quantity instruments are likely to be consistent with climate policy instruments of trading partners not least because of the proliferation of emissions trading in several jurisdictions in the past 15 years, facilitating international cooperation on climate policy. Fourth, quantity instruments are better suited to translate international climate change commitments, which often put quantity limits on GHG emissions, into national policy. Finally, as the proliferation of ETSs in several jurisdictions attest, political-economy considerations seem to favour quantity instruments.[28]

The efficiency of (sub)national and regional ETSs could be enhanced by linking them to one another, thereby establishing trade in emissions allowances between previously isolated ETSs. The next Section takes stock of the linking literature and introduces the research questions that this dissertation aims to address.

ex post.

25 RG Newell and WA Pizer, 'Regulating Stock Externalities under Uncertainty' (2003) 45 Journal of Environmental Economics and Management 416, 417; Perman and others (n 18) 169-170.

26 Hepburn, 'Regulation by Prices, Quantities or Both' (n 12) 231-232.

27 Meckling and Hepburn (20) 471-474.

28 Currently, there are 18 ETSs in force. The number of ETSs is set to increase, with 17 ETSs scheduled to commence or under consideration in 14 countries. ICAP (n 2) 25. See also Kossoy and others (n 2) 40-47.

1.2. Linking ETSs: history of an idea

When two ETSs are bilaterally linked, regulated entities in one ETS are allowed to use, directly or indirectly, emissions units from the other system to meet their domestic compliance obligations.[29] Without linking, the price of emissions allowances in different jurisdictions is likely to be different. The price difference reflects a loss in efficiency that would have been realised had trade in emissions allowances been allowed between regulated entities of the different ETSs. With linking, the carbon currencies of the linking-partner ETSs become fungible, allowing inter-system trade in emissions rights between the relevant ETSs. The inter-system trade in emissions rights reallocates allowances to their highest use. It does this by increasing allowance prices in one market and decreasing in the other market until prices fully converge. The equalisation of prices (marginal costs of abatement) across the linking-partner ETSs achieves the aggregate emissions cap at the least possible abatement cost.[30]

Linking ETSs also increases market liquidity, minimises price volatility, and eliminates competitive distortions that might arise from differences in pre-link allowance prices.[31] In addition to its economic advantages, linking has been touted as a *de facto* or *de jure* bottom-up international climate policy architecture that would serve as a stepping stone to, a substitute for, or a complement to the climate policy architecture of the United Nations Framework Convention on Climate Change (UNFCCC).[32]

The potential that linking ETSs could reduce emissions reduction costs without compromising environmental effectiveness created enthusiasm among regional and

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29 E Haites, 'Harmonization between national and international tradable permit schemes' (OECD 2003) 5, CATEP Synthesis Paper <http://www.oecd.org/env/cc/2957623.pdf> accessed 8 November 2016.

30 Lazarowicz, for instance, estimated that a global trade in emissions rights could reduce emissions reduction costs by up to 70 per cent by 2020 compared to a scenario where countries meet their emissions reduction targets through domestic abatement alone. M Lazarowicz, *Global Carbon Trading: A Framework for Reducing Emissions*, (TSO 2009) 31-32.

31 RN Stavins and J Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions: Opportunities, Implications, and Challenges' (IETA 2007) Report for International Emissions Trading Association <http://belfercenter.hks.harvard.edu/files/IETA_Linking_Report.pdf> accessed 7 December 2015; A Tuerk and others, 'Linking Carbon Markets: Concepts, Case Studies and Pathways' (2009) 9 Climate Policy 341, 344.

32 J Jaffe, M Ranson and R Stavins, 'Linking Tradable Permit Systems: A Key Element of Emerging International Climate Policy Architecture' (2009) 36 Ecology Law Quarterly 789, 802-807.

(sub)national actors and businesses. For instance, Arnold Schwarzenegger, Governor of the State of California from 2003 to 2011, mandated the State Air Resources Board in 2006 to, *inter alia*, 'develop a comprehensive market-based compliance program with the goal of creating a program that permits trading with the European Union, the Regional Greenhouse Gas Initiative and other jurisdictions.'[33] In 2007 leaders of more than 15 governments established the International Carbon Action Partnership (ICAP) as 'an international forum for governments and public authorities' with the objective of, *inter alia,* facilitating linkages between ETSs.[34] Arguably, the European Union (EU) has been at the forefront of promoting linkages between ETSs.[35] In the lead upto the 2009 Copenhagen Climate Change Conference, the European Commission outlined its vision of creating a carbon market encompassing countries in the Organisation for Economic Cooperation and Development (OECD) by 2015 that could be expanded to include ETSs in emerging economies by 2020.[36] Businesses have actively promoted linking ETSs through the International Emissions Trading Association - a business association that counts some of the largest firms in finance, power and extractive industry among its members.[37]

Despite its theoretical appeal, linking ETSs has proven difficult in practice.[38] As of 2017, only two linked carbon markets – California-Quebec and the Regional Greenhouse Gas Initiative (RGGI) – are in operation.[39] Although the EU and

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33 Cal Exec Order No S-20-06, para 5.

34 International Carbon Action Partnership (ICAP), 'About ICAP' (ICAP 2017) <https://icapcarbonaction.com/en/partnership/about> accessed 17 May 2017.

35 J Wettestad and T Jevnaker, 'The EU's Quest for Linked Carbon Markets: Turbulence and Headwind' in Cherry T, Hovi J and McEvoy D (eds), *Toward a New Climate Agreement: Conflict, Resolution and Governance* (Routledge 2014); MA Mehling, 'Legal Frameworks for Linking National Emissions Trading Systems' in Carlarne CP, Gray KR and Tarasofsky RG (eds), T*he Oxford Handbook of International Climate Change Law* (Oxford University Press 2016) 258;

36 Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards a comprehensive climate change agreement in Copenhagen' COM (2009) 39/3 final, 11.

37 International Emissions Trading Association (IETA), 'Our Mission' (IETA 2017) < http://www.ieta.org/Our-Mission> accessed 17 May 2017. For an excellent analysis of the role of business in the rise of emissions trading, see J Meckling, *Carbon Coalitions: Business, Climate Politics, and the Rise of Emissions Trading* (The MIT Press 2011).

38 The obstacles for linking have been the subject of academic inquiry over the past ten years or so. For a discussion of barriers to linking, see Section 2.5 in Chapter 2.

39 California Air Resource Board and the Gouvernement du Quebec, 'The Harmonisation and Integration of Cap-and-Trade Programs for Reducing Greenhouse Gas Emissions' <http://www.arb.

Switzerland agreed to bilaterally link their ETSs and finalised technical negotiations in January 2016, the agreement will not enter into force until the treaty is signed and ratified by both sides.[40] The European Commission's ambition to establish an OECD-wide market by 2015 never materialised. A 2012 agreement between the EU and Australia to link their respective carbon markets as of 2015 fell apart due to the abolition of the Australian Carbon Pricing Mechanism.

Notwithstanding the limited success in linking ETSs in practice, the idea has continued to capture the imaginations of policymakers, the private sector, and academics. In the lead up to the 2015 UN Climate Change Conference in Paris, the UK's House of Commons outlined in a report that any future agreement 'should promote the use of carbon markets and facilitate the future linking of emissions trading systems'.[41] Some of the world's largest gas and oil companies called upon the UN and governments to 'introduce carbon pricing systems (...) [and] create an international framework (…) that could eventually connect national systems.'[42] Bodansky and his colleagues, for instance, outline how a future agreement in Paris could facilitate the adoption of and the linking between carbon markets by providing a common institutional infrastructure enabling trade in emissions rights across borders.[43]

ca.gov/cc/capandtrade/linkage/ca_quebec_linking_agreement_english.pdf> accessed 16 December 2015. See also B Doda and L Taschini, 'Carbon Dating: When is it Beneficial to Link ETSs?' (2016) Grantham Research Institute on Climate Change and the Environment Working Paper No. 208 <http://www.lse.ac.uk/GranthamInstitute/publication/carbon-dating-when-is-it-beneficial-to-link-etss/> accessed 7 November 2016.

40 Linking the Swiss and EU emission trading schemes (*Swiss Federal Office for the Environment*, 25 January 2016) <https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/climate-policy/emissions-trading/linking-the-swiss-and-eu-emissions-trading-schemes.html> accessed 13 February 2017.

41 House of Commons Energy and Climate Change Committee, *Linking Emissions Trading Systems* (HC 2014-15, HC 739) 3.

42 United Nations Framework Convention on Climate Change (UNFCCC), 'Six Oil Majors Say: We Will Act Faster with Stronger Carbon Pricing: Open Letter to UN and Governments' (UNFCCC, 01 June 2015) <http://newsroom.unfccc.int/unfccc-newsroom/major-oil-companies-letter-to-un/> accessed 17 May 2017.

43 DM Bodansky and others, 'Facilitating Linkage of Climate Policies through the Paris Outcome' (2016) 16 Climate Policy 956, 961-962.

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1.3. Research questions

Two fundamental properties of a cap-and-trade system - cost effectiveness and environmental effectiveness - has made it a preferred instrument of climate change policy in several jurisdictions.[44] Linking ETSs, as explained above, leads to greater efficiency without undermining environmental effectiveness.[45] This observation is, however, based on several assumptions, with roots in a neoclassical economics conceptualisation of (carbon) markets. Firstly, it assumes that cap-and-trade systems are 'properly designed' in the sense that they include features that economic theory considers 'optimal'. Secondly, it (implicitly) assumes that cost effectiveness and environmental effectiveness constitute the primary, if not the only, objectives of cap-and-trade systems. Finally, and perhaps more importantly, it ignores the political origins of (carbon) markets.

As Brousseau and Glachant argue, markets are 'manufactured' complex institutions.[46] This characterisation is especially pertinent for ETSs since they are constructed in all their dimensions. The basic building blocks of an ETS such as a cap and an allocation system have to be actively designed and governed. Importantly, the process of constructing carbon markets is an inherently political process that involves multiple actors with diverse, if not conflicting, economic and non-economic interests. As a result, ETSs are inherently imperfect not only because they are created by the 'trembling hands' of boundedly rational humans, but also because they embody political compromises between different political actors with diverse interests and preferences.[47] Also, it is not a given that each ETS aspires to just achieve a predefined emissions reduction target cost effectively.[48] Conceptualised as such,

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44 Meckling and Hepburn (n 20) 478-480.

45 Gruell and Taschini (n 45).

46 E Brousseau and JM Glachant, 'Introduction: Manufacturing Markets – What it Means and Why it Matters' in E Brousseau and JM Glachant (eds), *The Manufacturing of Markets: Legal, Political and Economic Dynamics* (Cambridge University Press 2014). See also SK Vogel, 'Why Freer Markets Need More Rules' in MK Landy, MA Levin and M Shapiro (eds), *Creating Competitive Markets: The Politics of Regulatory Reform* (Brookings Institution Press 2007).

47 Brousseau and Glachant (n 46) 3-4.

48 For instance, the General Court and the Court of Justice of the European Union decided that the 'principal declared objective [of the EU ETS] is to reduce greenhouse gas emissions substantially' and that cost-effectiveness and efficiency are 'sub-objectives'. See Case T-374/04 *Germany v Commission* [2007] ECR 11-4431, para 124; Case C-127/07 *Arcelor* [2008] ECR 1-09895, para 31; Case T-183107 *Poland v Commission* [2009] ECR 11-03395, para 81. See also L Squintani, M Holwerda

whether an ETS leads to a cost-effective achievement of a given emissions reduction target depends on how the relevant ETS is designed. By implication, whether linking ETSs leads to greater efficiency than autarky without affecting aggregate emissions levels depends on the specific designs of the linking-partner ETSs, requiring a case-by-case analysis of cap-and-trade systems and linkages between them.[49]

The need for a case-by-case analysis could be illustrated by examining analysis into the implications for linking of different allowance allocation mechanisms. Standard economic theory suggests that the cost-effective achievement of an emissions reduction target by a cap-and-trade system is independent of the initial distribution of emissions allowances. This observation, known as the 'independence property' of cap-and-trade systems,[50] is based on Ronald Coase's insight in 'social cost' that if transaction costs are zero or sufficiently low and that property rights are properly specified and assigned, the price mechanism drives resources to their highest use and that this will be independent of the initial distribution of the property rights.[51] The independence property, to quote Hahn and Stavins, 'is a key reason that cap-and-trade systems have been employed and have evolved as the preferred instrument in a variety of environmental policy settings'.[52] It also led to the characterisation of differences in systems of allowance allocation between to-be-linked ETSs as unlikely to be significant impediments to linking.[53]

However, the 'independence property' of cap-and-trade systems may not always hold true. First, the property is based on a categorisation of allowance allocation systems into free allocation and auctioning. While free allocation and auctioning

and K de Graaf, 'Regulating Greenhouse Gas Emissions from EU ETS Installations: What Room is Left for the Member States' in M Peeters, M Stallworthy and JC de Larragán (eds), *Climate Law in EU Member States: Towards National Legislation for Climate Protection* (Edward Elgar 2012).

49 This observation is consistent with Ronald Coase's insight on the role laws and institutions play in affecting efficiency and allocation of resources. See, generally, RH Coase, 'The Problem of Social Cost' (1960) 3 Journal of Law & Economics 1. For an extended treatment of Coase's contribution towards the development of emissions trading, see Section 2.2 in Chapter 2.

50 See, generally, RW Hahn and RN Stavins, 'The Effect of Allowance Allocations on Cap-and-Trade System Performance' (2011) 54 Journal of Law and Economics 267.

51 Coase, 'Social Costs' (n 49) 8.

52 See, generally, Hahn and Stavins (n 50).

53 See, for instance, MJ Mace and J Anderson, 'Legal and Design Issues Arising in Linking the EU ETS with Existing and Emerging Emissions Trading Schemes' (2009) 6 Journal for European Environmental and Planning Law 197, 224; Tuerk and others (n 31) 346-347

represent two broad categories of distributing the rents created by an ETS, they by no means capture the full complexity of allocation rules in different jurisdictions. For instance, free allocation of allowances itself has several variants. It could be based on historical emissions levels (grandfathering), sector-wide benchmarks and a covered entity's current production levels, or sector-wide benchmarks and historical production levels.[54] Second, as Coase himself pointed out, the price mechanism does not always lead to the most optimal outcome especially when transaction costs are positive.[55] With positive transaction costs, both efficiency and environmental integrity of an ETS (and of linked ETSs) depend on the institutions that determine how allowances are allocated in the linking-partner jurisdictions.

In summary, one needs to analyse the specific rules of, say, allowance allocation and examine how they affect economic efficiency and environmental integrity before concluding *a priori* that different allocation mechanisms do not affect cost-effectiveness and environmental effectiveness of an ETS (and of a linked ETS). This dissertation aims at assessing whether and how linking ETSs with different design features affect cost-effectiveness and environmental effectiveness of a linked carbon market on a case-by-case-basis, not least because of significant design differences between real-life ETSs.[56] Hence, the central question of the research is: How does linking ETSs affect cost-effectiveness and environmental effectiveness of linked carbon markets? To address the central question, three research questions need to be answered:

1. What are the major design differences between linking-partner ETSs?
2. What are the cost-effectiveness and environmental effectiveness implications of linking ETSs with different design features?
3. What do these implications imply for policy towards linking ETSs?

Our research builds on the linking literature that focuses on mapping out

[54] PMR (Partnership for Market Readiness), 'Carbon Leakage: Theory, Evidence, and Policy' (World Bank 2015) PMR Technical Note 11 <http://hdl.handle.net/10986/22785> accessed on 28 August 2016, 38-39.

[55] RH Coase, 'The Relevance of Transaction Costs in the Economic Analysis of Law' in F Parisi and CK Rowley (eds), *The Origins of Law and Economics: Essays by the Founding Fathers* (Edward Elgar 2005) 207-208. See also C Veljanovski, *Economic Principles of Law* (Cambridge University Press 2007) 52-53; Hahn and Stavins (n 50) 271-279.

[56] To see the diversity of real-life ETSs, see SE Weishaar, *Emissions Trading Design: A Critical Overview* (Edward Elgar 2014) 66-98.

barriers to linking ETSs.[57] This strand of the linking has examined how and why different design features might erect barriers to linking ETSs.[58] Owing partly to the limited number of ETSs in operation, the early work on barriers to linking focused on theoretical design variants and examined how linking ETSs with different design variants affect, among other things, environmental integrity and economic efficiency of linked carbon markets.[59] Some design differences are considered 'critical' for facilitating linking ETSs because of their likely impact on efficiency and environmental integrity.[60] As a result, differences in such 'critical' design features are regarded as significant obstacles for linking. These include, for instance, offset provisions and cost-containment measures (price floor, price ceiling and the like).[61] On the other hand, such design differences as the allocation of allowances and coverage of sectors are considered not to pose significant obstacles for linking either because they do not affect the efficiency and environmental integrity of the linked market or their effect on environmental integrity and economic efficiency is independent of linking.[62]

Although similar to the literature on barriers to linking, our analysis relies on real-life ETSs rather than theoretical design variants of ETSs. Admittedly, the use of prototypical design variants simplifies the complexity of real-life ETSs and provides valuable insights into how functionally comparable design features interact

57 See, for instance, MJ Mace and others, 'Analysis of Legal and Organisational Issues Arising in Linking the EU Emissions Trading Scheme to other Existing and Emerging Emissions Trading Schemes' (European Commission 2008). For a concise review of the literature, see MA Mehling, 'Legal Frameworks for Linking National Emissions Trading Systems' in CP Carlarne, KR Gray and RG Tarasofsky (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press 2016) 261-265.

58 See, for instance, Mace and others, 'Legal and Organisational Issues Arising in Linking' (n 57); A Roßnage, 'Evaluating Links between Emissions Trading Schemes: An Analytical Framework' (2008) 4 Carbon & Climate Law Review 394; C Flachsland, R Marschinski and O Edenhofer, 'To Link or not to Link: Benefits and Disadvantages of Linking Cap-and-Trade Systems' (2009) 9 Climate Policy 358; Mace and Anderson, 'Legal and Design Issues' (n 53); Tuerk and others (n 31).

59 See, for instance, C Fisher, 'Combining Rate-based and Cap-and-trade Emissions Policies' (2003) Climate Policy 89; R Marschinski, 'Efficiency of Emissions Trading between Systems with Absolute and Intensity Targets' (2008) Potsdam Institute for Climate Impact Research <http://edoc.gfz-potsdam.de/pik/4951> accessed 8 November 2016; Roßnage (n 58) 395; Tuerk and others (n 31).

60 Roßnage (n 58); Mace and Anderson, 'Legal and Design Issues' (n 53) 217-220; Tuerk and others (n 31) 347-349.

61 Mace and Anderson, 'Legal and Design Issues' (n 53) 217-220; Tuerk and others (n 31) 347-349.

62 Mace and Anderson, 'Legal and Design Issues' (n 53) 224-225; Tuerk and others (n 31) 346-347.

and what effects they produce. However, the reliance on prototypical ETSs cannot capture, as explained above using the example of allowance allocation systems, the full complexity of real-life ETSs.

1.4. Research design

In examining whether and how linking ETSs may affect cost-effectiveness and environmental effectiveness, the research employs a qualitative case study research design focusing on four issue areas: free allocation systems, offset provisions, market stabilisation measures, and policy durability. Systems of allocating allowances free of charge are selected because they represent issues that are considered, as described above, in the existing literature as unlikely to raise cost-effectiveness and environmental-effectiveness concerns. In analysing if and how different systems of allocating allowances free of charge affect efficiency and environmental effectiveness, we take the allocation systems of the EU ETS and the Australian Carbon Pricing Mechanism (CPM) as case studies.[63] Both the EU ETS and the Australian CPM have used the allocation of allowances free of charge to sectors exposed to international competition as a mechanism of addressing competitiveness and carbon leakage concerns. Despite this apparent similarity, each system's free allocation scheme varies from the other along several lines. These broadly similar, yet different, allocation systems provide an ideal setting to analyse if and how different free allocation schemes affect the economic efficiency and environmental integrity of a linked carbon market.

In comparison to allowance allocation systems, differences in offset provisions belong to design features that are considered as significant challenges for linking due to their likely impact on environmental integrity and economic efficiency.[64] The central thesis of this argument is that linking ETSs with different offset provisions leads to a 'back-door' problem, where more restrictive offset provisions of an ETS

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[63] The Australian CPM was abolished in 2014, roughly two years after its launch in 2012. Despite this, we have used the Australian CPM as one of our case studies. Since competitiveness and carbon leakage concerns are central in carbon pricing in general, the insights from this analysis contributes to other ETSs – current and future alike.

[64] An offset programme awards credits for emission reductions and removals realised in 'uncapped' sectors and regions. If accepted by an ETS as alternative instruments of compliance, the offset credits are used to 'offset' (compensate) for emissions of firms covered under the relevant ETS. See, generally, RW Hahn and KR Richards, 'Environmental Offset Programs: Survey and Synthesis' (2010) Indiana University School of Public & Environmental Affairs Research Paper No. 2010-12-01, 2-4 <https://ssrn.com/abstract=1721544> accessed 25 May 2017.

would be circumvented through a linking-partner that enforces less restrictive rules on the use of offset credits.[65] As we show in Chapter 5, however, linking two cap-and-trade systems with different offset provisions does not necessarily lead to a worse efficiency or environmental integrity outcome than the case in autarky. We show this by reviewing the offset provisions of major ETSs and analysing the likely effects of the differences in their offset provisions on efficiency and environmental integrity.

Market stabilisation measures and policy durability represent newly emerging issues that have thus far received limited attention in the literature on linking ETSs. The persistently low allowance prices in the EU ETS has reignited debates about the dynamic efficiency of cap-and-trade schemes. Within the context of the EU ETS, the debate has largely focused on the causes of the price slump,[66] policy options to address the problem in the short- and long-run,[67] and the efficiency, environmental effectiveness, and political feasibility of the various options.[68] Despite the potentially significant risk that linking poses to market stability by facilitating contagion of localised price shocks and consequently eroding political support for domestic ETSs,[69] studies analysing the linking implications of market stabilisation measures are largely absent.

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65 See, for instance, Tuerk and others (31) 346-347; J Jakob-Gallmann, *Regulatory Issues in the Carbon Market: The Linkage of the Emissions Trading System of Switzerland with the Emissions Trading Scheme of the European Union* (Schulthess 2011) 140-142; House of Commons Energy and Climate Change Committee, *Linking Emissions Trading Systems* (HC 2014-15, HC 739) 14.

66 For instance, Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A policy framework for climate and energy in the period from 2020 to 2030' COM (2014) 15 final; N Koch and others, 'Causes of the EU ETS Price Drop: Recession, CDM, Renewable Policies or a Bit of Everything? – New Evidence' (2014) 73 Energy Policy 676.

67 G Grosjean and others, 'After Monetary Policy, Climate Policy: Is Delegation the Key to EU ETS Reform?' (2016) 16 Climate Policy 1; C de Perthuis and R Trotignon, 'Governance of CO_2 Markets: Lessons from the EU ETS' (2014) 75 Energy Policy 100.

68 B Knopf and others, 'The European Emissions Trading System (EU ETS): Ex Post Analysis, the Market Stability Reserve and Options for a Comprehensive Reform' (2014) FEEM Working Paper No 79.2014 <http://ssrn.com/abstract=2499457> accessed 8 December 2015; SE Weishaar, 'Incentivising Technologic Change in Emissions Trading Systems: The Case of Excess Supply' in L. Kreiser and others (eds), *Environmental Taxation and Green Fiscal Impact: Theory and Impact* (Edward Elgar 2014).

69 WJ McKibbin, A Morris and PJ Wilcoxen, 'Expecting the Unexpected: Macroeconomic Volatility and Climate Policy' (2008) Brookings Global Economy and Development Working Paper No. 28 <http://ssrn.com/abstract=1324938> accessed 7 December 2015.

Our analysis focuses on the market stabilisation measures of the EU ETS and the South Korean ETS (hereafter: Korean ETS). The market stabilisation measures of these ETSs are selected because they represent different spectra of the debate on market stabilisation measures. The EU ETS's Market Stability Reserve (MSR) – a quantity-based system of scarcity management – manages supply of allowances in response to predefined quantity-based triggers.[70] The Korean ETS, by contrast, included multiple instruments including price-based instruments such as price floor and price ceiling and quantity-based instruments such as an allowance reserve scheme. These different approaches to addressing a similar challenge provide ideal inputs to examine the welfare implications for linked carbon markets of combining price-based and quantity-based instruments of market stabilisation.

Finally, the interface between climate policy durability and linking came to the fore with New Jersey's withdrawal from the RGGI and the faltering of the EU-Australia agreement to link their respective ETSs as of 2015 when Australia decided to abolish its CPM in 2014.[71] The EU ETS, 11 years old and counting, has thus far proved durable despite several challenges since its inception. In contrast, the Australian CPM was abolished in just two years after its launch in 2012. We explain why the EU ETS has proved durable in the face of several challenges while the Australian CPM unravelled quickly. As discussed in Chapter 6, understanding these factors has important policy implications for linking ETSs.

1.5. Analytical framework

The research applies a comparative law and economics framework in addressing the research questions. Comparative law and economic analysis of law, each constituting a distinct discipline, allow 'a detached outside look at the actual dynamics of the law',[72] and can be integrated to complement each other in several ways.[73] This Section synthesises the analytical framework by combining insights from both comparative

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[70] Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC [2015] OJ L264/1.

[71] See generally WA Pizer and AJ Yates, 'Terminating Links between Emission Trading Programs' (2015) 71 Journal of Environmental Economics and Management 142.

[72] U Mattei, *Comparative Law and Economics* (The University of Michigan Press 1997) 10.

[73] F Faust, 'Comparative Law and Economic Analysis of Law' in M Reimann and R Zimmermann (eds), *The Oxford Handbook of Comparative Law* (Oxford University Press 2006) 845-863.

law and law and economics. After briefly describing comparative law (Section 1.5.1) and law and economics (Section 1.5.2) as analytical tools, Section 1.5.3 explains how the two could be linked to provide an integrated theoretical framework for analysing the efficiency and environmental integrity implications of linking ETSs.

1.5.1. Comparative law

Comparative law is generally concerned with analysing particular institutions, problems, laws, and legal systems of the world.[74] The comparison aims at discovering, explaining and evaluating similarities and differences as well as identifying influences between the various laws, institutions, problems or legal systems.[75] In this endeavour, functionalism serves as the principal method of comparative law.[76] This method assumes that all societies face mostly similar challenges and that they need to devise institutions that meet these challenges.[77] These institutions are functionally equivalent (similar) in the sense that they 'fulfil similar functions in different legal systems'.[78] The presumption of similarity (*praesumptio similitudinis*) is central to the functionalist comparative law thesis. Michaels explains what the presumption of similarity does and does not say as follows:

> What is presumed to be similar are neither the legal institutions, nor the problems to be solved by them and the need for societies to respond to them, but the functional relation between problems and solutions: if a society has a certain problem *a*, it must have a legal institution *y*, and different solutions to *a* are functionally equivalent. This does not mean that different solutions to similar problems, the core element of

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[74] K Zweigert and H Kötz, *An Introduction to Comparative Law* (Tony Weir tr, 3rd edn, Oxford University Press 1998); R Michaels, 'Comparative Law' in H Basedow and R Zimmermann (eds), *Oxford Handbook of European Private Law* (Oxford University Press 2011).

[75] Michaels, 'Comparative Law' (n 74).

[76] Zweigert and Kötz postulated the methodological monopoly of the functional approach to comparative law, maintaining 'the basic methodological principle of all comparative law is that of functionality'. Zweigert and Kötz (n 74) 34. This statement, however, has since proved controversial and so much ink has been spilt attacking the methodological monopoly of the functionalism approach. For a review and discussion of the controversy, see R Michaels, 'The Functionalist Method of Comparative Law' in M Reimann and R Zimmermann (eds), *The Oxford Handbook of Comparative Law* (Oxford University Press 2006).

[77] Zweigert and Kötz (n 74).

[78] Michaels, 'The Functionalist Method' (n 76) 342.

the functional method, are really 'similar' ….[79]

Functional equivalence is thus similarity in difference. In the context of emissions trading, the presumption of similarity can be explained by using the systems of distributing allowances in different jurisdictions. Allocation rules decide on a myriad of issues including the modes of allocation (for instance, auctioning, free allocation or any combination thereof); if free allocation is opted for, the basis for free allocation (for instance, benchmarking, grandfathering or some other rule); and the treatment of firms entering or exiting the scheme after it commenced. Some jurisdictions may opt for auctioning while others preferring a free allocation system based on grandfathering or other criteria such as benchmarking.

The specific rules of allocation differ from one jurisdiction to another. Despite the differences, the allocation rules are functionally equivalent in that they fulfil the similar function of distributing the scarcity rents created by an ETS and addressing concerns such as competitiveness and leakage. In conclusion, functionalism allows comparison of institutions in different legal systems while those institutions maintain their differences for it 'neither presumes, nor does it lead to, similarity.'[80]

1.5.2. Law and Economics

Law and Economics, as an analytical method, refers to the use of the tools and methods of economics in examining legal rules and institutions.[81] Ronald Coase's contribution on social costs[82] and Guido Calabresi's article on the allocation of risks in tort law[83] are credited to have started the modern law and economics tradition, which applies economic theory to wide-ranging areas of law from family law to criminal law to constitutional law that once were considered immune to economic analysis.[84] Accepting the standard economic assumption that individuals are rational

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79 Michaels, 'The Functionalist Method' (n 76) 371.

80 Michaels, 'The Functionalist Method' (n 76) 372.

81 JL Coleman, 'Efficiency, Exchange, and Auction: Philosophical Aspects of the Economic Approach to Law' (1980) 68 California Law Review 221, 221; L Kornhauser, 'The Economic Analysis of Law', *The Stanford Encyclopaedia of Philosophy* (Summer edn, 2015) <http://plato.stanford.edu/archives/sum2015/entries/legal-econanalysis/> accessed 22 December 2015.

82 Coase, 'Social Cost' (n 49).

83 G Calabresi, 'Some Thoughts on Risk Distribution and the Law of Torts' (1961) 70 Yale Law Journal 499.

84 For a detailed discussion of the early history of law and economics, see CK Rowley, 'An Intellectual History of Law and Economics: 1739-2003' in F Parisi and CK Rowley (eds), *The Origins of Law and*

wealth-maximisers, law and economics analyses the role of law as an incentive mechanism that changes the relative prices attached to alternative actions.[85] There is nothing controversial about applying economic theory in studying markets – ETSs – that are created with the explicit purpose of economising on transaction costs, thereby allocating scarce resources – pollution rights – to those who value them the most.

Law and economics has positive and normative variants.[86] Positive law and economics uses economic theory to *explain* or *predict* how rational wealth-maximising actors respond when subject to a given rule. For instance, Posner's thesis that 'the common law is best (not perfectly) explained as a system for maximising the wealth of society' is a positive theory aimed at explaining the common law.[87] In contrast, normative law and economics maintains that the legal system ought to be organised in such a way that it promotes economic efficiency. Rather than using efficiency to explain how a law has evolved over time or to predict how it will develop in the future, the normative analysis views efficiency as a normative criterion for prescribing how it ought to be organised.[88] For instance, Calabresi's assertion that the goal of tort law should be to 'minimise the sum of the costs of accidents and the costs of preventing accidents'[89] is grounded in the normative belief that legal rules should be designed to promote efficiency. This dissertation follows the positivist tradition of using economic theory to explain the welfare effects of legal rules and institutions.

Both normative and positive economic analyses of law use economic efficiency, albeit to different ends. Economists distinguish between Pareto-efficiency and

Economics: Essays by the Founding Fathers (Edward Elgar 2005). See also Veljanovski (n 55) 3-9; RA Posner, *Economic Analysis of Law* (8th edn, Wolters Kluwer 2011) 29-31.

85 F Parisi, 'Positive, Normative and Functional Schools in Law and Economics' (2004) 18 European Journal of Law and Economics 259, 262; A Ogus, *Costs and Cautionary Tales: Economic Insights for the Law* (Hart Publishing 2006) 25-31.

86 A third, and relatively new, branch of law and economics concerns functional law and economics that 'cut[s] across the positive and normative distinction … [and] is attentive to the identification of political failures in the formation of law, stressing the importance of market-like mechanisms in the creation and selection of legal rules'. See Parisi (n 85) 265.

87 Posner (n 84) 32; A Ogus, 'What Legal Scholars Can Learn from Law and Economics' (2004) 79 Chicago-Kent Law Review 383, 384-385.

88 TJ Miceli, *Economics of the Law* (Oxford University Press 1997) 3.

89 Calabresi (n 83); Veljanovski (n 55) 5.

Kaldor-Hicks efficiency.[90] Pareto-efficiency refers to a state of allocation that it is impossible to improve the welfare of an individual without reducing the welfare of others. By focusing on 'the individual and individual choice', Pareto-optimality precludes making interpersonal comparisons of welfare, making it almost unusable in the real world.[91] On the other hand, a reallocation is Kaldor-Hicks efficient if those that are made better off by the reallocation could (hypothetically) compensate those that are made worse off and still be better off.[92] Because the Pareto-optimality criterion leaves no room for an interpersonal comparison of utility, hence very restrictive, the Kaldor-Hicks efficiency criterion is often used in policy analysis.[93] Efficiency, in the context it is used in this book, refers to Kaldor-Hicks efficiency.

1.5.3. Comparative law and economics: Application to linking

How can functional comparative law and economic analysis of law be integrated? Faust suggests two standard avenues for the two disciplines to be linked.[94] First, economic analysis of law can be used as ancillary to comparative law. In this sense, a comparatist could use efficiency as an *explanatory* device in assessing the benefits and costs of different national rules in comparison to each other (a descriptive approach);[95] or as a ranking criterion of various national rules (a normative exercise).[96] Alternatively, and second, comparative law can be used as ancillary to economic analysis of law. Because economic analysis of law studies the efficiency of legal rules and institutions, comparative law could provide economic analysis with the objects of the study – the legal rules and institutions, bringing 'economic analysis down from the clear, blue skies of economic theory to the varied and complex conditions on earth'.[97] This research employs the functional comparative law method as ancillary

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90 See, generally, Ogus, *Costs and Cautionary Tales* (n 68) 27-29; Veljanovski (n 67) 32-33.

91 Veljanovski (n 67) 32.

92 Ogus, *Costs and Cautionary Tales* (n 85) 27; K Mathis, *Efficiency Instead of Justice? Searching for the Philosophical Foundations of the Economic Analysis of Law* (Deborah Shannon tr, Springer 2009) 38-39.

93 In Posner's words, '… [w]hen an economist says that free trade or competition or the control of pollution or some other policy or state of the world is efficient, nine times out of ten he means Kaldor-Hicks efficient'. Posner (n 84) 18.

94 See Faust (n 73) 845-863.

95 Faust (n 73) 845-847.

96 Faust (n 73) 847-849.

97 Faust (n 73) 852.

to the economic analysis of linking.

The theoretical framework, combining the analytical methods of comparative law and economic analysis of law, is necessitated, first, by the research's focus on real-life ETSs spanning several jurisdictions, and, second, by its aim to analyse efficiency implications of linking the ETSs. The efficiency analysis, which is the domain of economic analysis of law, hinges on identifying comparable legal rules and institutions of the relevant ETSs. The latter is a comparative law exercise, requiring identifying legal rules and institutions that cater to roughly similar practical challenges in different jurisdictions.[98] The legal rules and institutions so identified from different jurisdictions serve as inputs in our economic analysis.

An implication of the functional approach to law means that legal rules are selected and analysed on the basis of their likely impact on cost-effectiveness and environmental effectiveness of linked carbon markets. Our analysis remains at a system level, focusing on core design elements of linking-partner ETSs. In doing so, we focus on the implications of linking ETSs with different design features for economic efficiency and environmental integrity of the linked carbon market. The economic efficiency criterion refers to whether a linked carbon market achieves a specified emissions reductions target at the lowest possible abatement cost to society.[99] In theory, once an environmental agency specifies a particular level of pollution clean-up and assigns tradable pollution permits, regulated entities will bargain their way to efficiency. Linking ETSs increases the efficiency of isolated carbon markets by expanding market size, increasing market liquidity and diversifying abatement options.

The environmental effectiveness/integrity test is less straightforward than the economic efficiency criterion. In its most basic sense, it is used to assess whether a

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98 In organising a market for pollution rights, jurisdictions face roughly similar problems. They have to decide on a myriad of issues ranging from coverage of the market (in terms of both sectors and GHG emissions), the point of regulation (upstream, downstream, or hybrid), the scheme's cap (absolute or relative), mode of allowance allocation (such as free allocation or auctioning), cost-containment measures (such as banking, borrowing, offsets and price ceiling), and compliance and penalty. The inherently political nature of designing carbon markets and the several compromises that have to be struck between actors with differing and conflicting interests and preferences mean that different jurisdictions are likely to respond to these practical challenges differently. A cursory look at existing ETSs shows the complex emissions trading landscape whereby ETSs vary along several of their design features. See, generally, Weishaar, *Emissions Trading Design* (n 56) 66-98.

99 See text to notes 90–93 above. See also Baumol and Oates (n 17) 58-60 and 177.

climate policy instrument can achieve a predefined level of emissions reduction.[100] A cap-and-trade system could be considered in this sense as environmentally effective because it guarantees that a pre-defined emissions reduction target will be achieved. This conclusion, of course, assumes that the cap-and-trade system has a credible compliance and enforcement mechanism and a robust monitoring, reporting and verification (MRV) regime. A credible compliance and enforcement mechanism incentivises regulated entities to hold a sufficient number of pollution permits covering their emissions over a given compliance period, while a robust MRV regime ensures that GHG emissions over a compliance period are properly accounted.

Environmental integrity of an ETS might also include the environmental integrity of emissions units it accepts for compliance purposes. Especially when offset credits are accepted as alternative instruments of compliance, their environmental integrity – that they represent real, permanent and additional emissions reductions – is crucial to the environmental integrity of an ETS.[101] Environmental effectiveness has also come to be understood broadly to include a climate policy instrument's effect on carbon leakage.[102] Carbon leakage refers to cases when a climate policy, in our case emissions trading, induces firms to emigrate to regions with less stringent (or without any) climate policy and continue to emit GHGs. Rather than reducing GHG emissions, the introduction of an ETS may just displace it to 'pollution havens'.[103]

The focus on efficiency and environmental integrity need not imply that these are the only goals of ETSs or that other objectives are less relevant. Jurisdictions may pursue policy objectives that do not squarely fit into the efficiency and environmental integrity labels not least because the process of designing carbon markets is inherently political and that politics may trump good economics.[104] *Ex ante* political constraints and *ex post* implementation hurdles may obstruct the

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[100] See Weishaar, *Emissions Trading Design* (n 56) 40-41.

[101] See A Prag, G Briner and C Hood, 'Making Markets: Unpacking Design and Governance of Carbon Market Mechanisms' (2012) Climate Change Expert Group Paper No. 2012(3), OECD/IEA <http://dx.doi.org/10.1787/5k43nhks65xs-en> accessed 4 September 2016, 21.

[102] See JE Aldy, S Barrett and RN Stavins, 'Thirteen Plus One: A Comparison of Global Climate Policy Architectures' (2003) 3 Climate Policy 373, 375.

[103] A Shoyer, J Sul and C van der Ven, 'Carbon Leakage and the Migration of Private CO_2 Emitters to other Jurisdictions' in CP Carlarne, KR Gray and RG Tarasofsky (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press 2016) 286-287.

[104] See Brousseau and Glachant (n 46) 1-9.

pursuit of efficiency and environmental integrity. Pursuing other objectives (than economic efficiency and environmental integrity), while legitimate, may come, however, at the cost of reducing efficiency.[105]

1.6. Plan of the book

The remainder of the book is structured into six chapters. Chapter 2 presents a review of the linking literature and discusses, *inter alia,* types of linking, the economics of linking, barriers to linking and governance aspects of linking.

Chapter 3 deals with issues of carbon leakage and free allocation of allowances in relation to linking. It compares leakage prevention measures of the EU ETS and the Australian CPM and analyses their linking implications. A central claim of the chapter concerns that although both the EU ETS and the Australian CPM follow a similar system of addressing leakage and competitiveness concerns, the devil lies in the detail. The methods of allocation of allowances to emissions-intensive trade-exposed industries vary significantly on, for instance, the benchmarks and activity levels used to calculate the number of allowances. These differences affect the efficiency and environmental effectiveness of linking. They may also create political obstacles for linking.

Chapter 4 deals with the linking implications of different market stabilisation measures. It takes market stabilisation measures of the EU ETS and the Korean ETS as case studies and analyses their linking implications from the perspective of economic efficiency, environmental integrity, and domestic policy priorities of the respective jurisdictions. While the EU ETS has established a single instrument – the Market Stability Reserve – to make the carbon market resilient to demand-side shocks, the Korean ETS has put together a list of quantity- and price-based instruments to address a similar concern. If the two carbon markets are linked, the mix of policy instruments may not only undermine the environmental effectiveness and economic efficiency of the linked carbon market, some of the instruments would unlikely be fit for purpose.

Chapter 5 examines whether differences between the offset provisions of to-be-linked ETSs impede linking. In the linking literature, differences in offset provisions are considered as significant impediments to linking. The claim is that different offset rules are problematic because they undermine the environmental integrity

[105] See Ogus, *Costs and Cautionary Tales* (n 85) 30-31.

of the linked carbon market. Chapter 5 reviews the offset rules of major ETSs, identifies their differences, and shows that differences in offset provisions do not necessarily undermine environmental integrity of a linked carbon market.

Chapter 6 studies the interrelationship between climate policy durability and linking. Policy durability is crucial for linking not least because the prospect that one of the linking-partner ETSs may not be politically sustainable erodes market participants' trust over the linkage and undermines the economic and political advantages of the linking.[106] The Chapter takes the EU ETS and the repealed Australian CPM as case studies and examines using a three-pronged criteria – commitment devices, policy feedback and political polarisation – why the EU ETS seems to be politically sustainable while the Australian CPM unravelled.

Chapter 7 draws the major findings of the research and explains the future of linking.

106 See generally Pizer and Yates (n 71).

2
Linking Emissions Trading Systems: A Review of the Literature

2

2.1. Introduction

The insights from international trade theory that there are economic gains from trade underpins the economics of linking emissions trading systems (ETSs).[107] Linking ETSs establishes a trade in emissions allowances between previously isolated carbon markets. The trading allocates abatement to wherever – within the reaches of the linked ETSs – it can be realised at the lowest possible abatement cost. The more diverse the marginal abatement cost (MAC) functions of regulated entities, the higher the gains (the cost savings) from the trade in emissions rights. In equilibrium, the trade in emissions rights equalises firms' MACs and achieves a predefined environmental target in a cost-effective manner.

Linking between ETSs has attracted considerable attention over the past decade as a natural next step to the increase in the use of emissions trading in pollution control in several jurisdictions across the globe. As early as 2009, the EU set out to establish, through linking, an OECD-wide carbon market by 2015 that will expand to include advanced developing countries by 2020.[108] Jaffe, Ranson and Stavins argued that linking ETSs provides 'the most promising' alternatives in comparison

[107] JF Green, T Sterner and G Wagner, 'A Balance of Bottom-up and Top-down Linking Climate Policies' (2014) 4 Nature Climate Change 1064, 1064.

[108] Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards a comprehensive climate change agreement in Copenhagen' COM (2009) 39/3 final, 11.

to other bottom-up international climate policy architectures whether in promoting participation and cost-effectiveness in the short run or in replacing, over the long term, the international climate policy architecture under the umbrella of the United Nations Framework Convention on Climate Change (UNFCCC).[109]

Despite the theoretical appeal of linking ETSs, it has proven difficult to realise in practice. Of the sixteen ETSs currently in force, there are only two bilaterally/multilaterally linked markets. The Regional Greenhouse Gas Initiative (RGGI) - a cap-and-trade scheme covering fossil fuel-fired power plants - emerged in 2009 as a multilaterally linked ETS involving nine north-eastern and mid-Atlantic states in the US.[110] The Californian ETS[111] and Quebec ETSs[112] have been bilaterally linked since 2014.[113] The EU and Switzerland have yet to implement a linking agreement

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109 J Jaffe, M Ranson and RN Stavins, 'Linking Tradable Permit Systems: A Key Element of Emerging International Climate Change Policy' (2009) 36 Ecology Law Quarterly 789; M Ranson and RN Stavins, 'Post-Durban Climate Policy Architecture Based on Linkage of Cap-and-Trade Systems' (2013) 13 The Chicago Journal of International Law 403.

110 The RGGI was conceived in 2005 as concerted effort of nine north-eastern and mid-Atlantic states in the US to launch a cap-and-trade scheme. It commenced in 2009 after partner states' legislative houses passed laws and regulations implementing the scheme. See Memorandum of Understanding (*Regional Greenhouse Gas Initiative*, 20 December 2005); Second Amendment to Memorandum of Understanding (*Regional Greenhouse Gas Initiative*, 20 April 2007) <https://www.rggi.org/design/history/mou> accessed 7 November 2016.

111 The California cap-and-trade programme is part of California's wide-ranging Global Warming Solutions Act of 2006 (commonly known as AB 32). AB 32 mandated the California Air Resource Board (ARB) to, *inter alia*, develop a market-based mechanism to achieve the State's emissions target of stabilising emissions at 1990 levels by 2020. The ARB adopted the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation that establishes the Californian cap-and-trade programme. See Cal Code Regs, tit 17, para 95801 et seq. The Programme commenced in 2012 and now covers about 450 entities in electricity, industrial, and fuel distribution sectors. See California Air Resource Board, 'Overview of ARB Emissions Trading Program' (California Environmental Protection Agency 2015) <http://www.arb.ca.gov/cc/capandtrade/guidance/cap_trade_overview.pdf > accessed 16 December 2015.

112 The Quebec cap-and-trade system has been up and running since 1 January 2013. During its first compliance period (2013-2014), it covered businesses in the industrial and electricity sectors with 25,000 metric tons or more of CO2 emissions per annum. Since its second compliance period (2015-2017), the system's sectoral coverage has expanded to include fossil fuel distributors. See Regulation respecting a cap-and-trade system for greenhouse gas emission allowances, Decree No 1297-2011 <http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=3&file=/Q_2/Q2R46_1_A.HTM>.

113 California Air Resource Board and the Gouvernement du Quebec, 'The Harmonisation and Integration of Cap-and-Trade Programs for Reducing Greenhouse Gas Emissions' <http://www.arb.

agreed in 2016 after five years of negotiation. A 2012 agreement between the EU and Australia to link their respective carbon markets as of July 2015 failed to materialise due to the abolition in 2014 of the Australian Carbon Pricing Mechanism (CPM). New Zealand and Australia – close allies and trade partners – had planned to link their carbon markets as early as 2015.[114] However, the Australian CPM rose and fell before any linking with the New Zealand ETS could see the light of day.

This Chapter reviews the literature on the linking ETSs. The remainder of the Chapter is organised as follows. Since the economic theory underlying linking ETSs is tightly linked to the theory of markets for pollution rights, Section 2.2 discusses the theory behind emissions trading. Section 2.3 defines linking and describes its different forms. Section 2.4 discusses expected benefits and concerns about linking ETSs. Section 2.5 examines impediments to linking. Section 2.6 discusses governance aspects of linking ETSs. Section 2.7 concludes the Chapter.

2.2. Emissions trading: theory and practice

The intellectual history of emissions trading can be traced back to Coase's seminal contributions on transaction costs and the institutions that humans devise to economise on transaction costs.[115] In his 1937 article – The Nature of the Firm, Coase asked why firms exist in the first place. Coase's 'nature of the firm' was, in essence, an attack on the (then) orthodox view that market transactions are costless. If market transactions are indeed costless, Coase wanted to know, why some transactions are organised within firms rather than markets? In neoclassical economic theory, the firm has been seen as a technological construction that transforms inputs into outputs.[116] Coase's answer, intuitive in hindsight, was that the firm exists because 'there is a cost of using the price mechanism'.[117] It is this 'cost of using the price mechanism' that was later termed as transaction cost, which refers to costs of arranging a contract *ex*

ca.gov/cc/capandtrade/linkage/ca_quebec_linking_agreement_english.pdf> accessed 16 December 2015.

114 Thompson Reuters, 'Australia, New Zealand could link carbon trade schemes in 2015' *Thompson Reuters* (5 December 2011) <http://www.reuters.com/article/us-australia-newzealand-carbon-idUSTRE7B40AK20111205> accessed 27 May 2017.

115 TH Tietenberg, *Emissions Trading: Principles and Practice* (Resources for the Future 2006); A Nentjes and E Woerdman, 'Tradable Permits versus Tradable Credits: A Survey and Analysis' (2012) 6 International Review of Environmental and Resource Economics 1.

116 RH Coase, *The Firm, the Market, and the Law* (The University of Chicago Press 1988) 5.

117 RH Coase, 'The Nature of the Firm' (1937) 4 Economica 386, 390.

ante and monitoring and enforcing that contract *ex post*.[118]

In his 1959 article – The Federal Communications Commission - Coase outlined how transaction costs preclude the market mechanism from addressing the pollution problem as follows:

> [I]f many people are harmed and there are several sources of pollution, it is more difficult to reach a satisfactory solution through the market. When the transfer of rights has to come about as a result of market transactions carried out between large numbers of people or organisations acting jointly, the process of negotiation may be so difficult and time-consuming as to make such transfers a practical impossibility. Even the enforcement of rights through the courts may not be easy. It may be costly to discover who it is that is causing the trouble. And, when it is not in the interest of any single person or organisation to bring suit, the problems involved in arranging joint actions represent a further obstacle. As a practical matter, *the market may become too costly to operate*.[119]

Coase expanded his analysis on the relevance of transaction costs in the economic system in his 1960 article on 'social costs'.[120] In 'social costs', Coase demonstrated that if transaction costs are zero and property rights are properly defined, the law has no impact on the efficient allocation of resources. Gains from trade will guide bargaining parties to the most efficient outcome.[121] The outcome will not only be efficient; it will also be independent of the initial assignment of property rights,

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[118] Williamson formalised the analysis of transaction costs, arguing that 'the economic institutions of capitalism have the main purpose and effect of economising on transaction costs'. OE Williamson, T*he Economic Institutions of Capitalism: Firms, Markets, Relational Contracting* (The Free Press 1985) 17.

[119] RH Coase, 'The Federal Communications Commission' (1959) 2 Journal of Law & Economics 1, 29 (emphasis added). As Libecap explains, 'the "commons" [problem] persists because of transaction costs. It is too costly to place boundaries around the resource; it is too costly to secure agreement to limit individual actions; and it is too costly to obtain enough information to determine the proper course of action to protect the resource.' See GD Libecap, 'State Regulation of Open-Access, Common-Pool Resources' in C Menard and MM Shirley (eds), *Handbook of New Institutional Economics* (Springer 2005) 546.

[120] RH Coase, 'The Problem of Social Cost' (1960) 3 Journal of Law & Economics 1.

[121] This insight was later formalised by George Stigler as the 'Coase Theorem', which states that 'under perfect competition private and social costs will be equal'. See GJ Stigler, *The Theory of Price* (3rd edn, Macmillan 1966) 113.

allowing policymakers to disentangle issues of economic efficiency and fairness.[122] The enduring legacy of Coase, however, remains his explication of 'the fundamental role which transaction costs do, and should, play in the fashioning of institutions which make up the economic system'.[123]

In a world of zero transaction costs, 'institutions which make up the economic system have neither substance nor purpose',[124] markets cannot fail, and there is no margin for government intervention. Humans devise laws and institutions to economise on transaction costs, making possible potentially welfare-enhancing transactions that would otherwise be impeded due to transaction costs.[125] Because transaction costs are almost always positive, laws and institutions become critical in affecting efficiency and the allocation of resources.[126] Coase reasoned as follows:

> If transaction costs were zero (…) people [would contract] … around the law whenever the value of production would be increased by a change in the legal position. But in a regime of positive transaction costs, such contracting would not occur whenever transaction costs were greater than the gain that such a redistribution of rights would bring. As a consequence the rights which individuals possess will commonly be those established by the law, which in these circumstances can be said to control the economy.[127]

Coase's insight that a properly defined property rights system could lead to an internalisation of the social costs of carbon later led the emergence of markets for pollution rights.[128] Thomas Crocker pointed out the applicability of the property

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[122] Coase, 'Social Cost' (n 120) 8. See also M Babiker, J Reilly and L Viguier, 'Is International Emissions Trading Always Beneficial?' 25 The Energy Journal 33.

[123] RH Coase, 'The Relevance of Transaction Costs in the Economic Analysis of Law' in F Parisi and CK Rowley (eds), *The Origins of Law and Economics: Essays by the Founding Fathers* (Edward Elgar 2005) 207.

[124] Coase, 'The Relevance of Transaction Costs' (n 123) 208.

[125] C Veljanovski, *Economic Principles of Law* (Cambridge University Press 2007) 52-53.

[126] Coase, 'Social Cost' (n 120). See also RO Zerbe Jr, *Economic Efficiency in Law and Economics* (Edward Elgar 2001) 168-174.

[127] RH Coase, 'Law and Economics at Chicago' (1993) 36 Journal of Law & Economics 239, 251.

[128] Tietenberg, *Emissions Trading* (n 115) 3-5. For a review of the early history of emissions trading, see DH Cole, 'Origins of Emissions Trading in Theory and Early Practice' in SE Weishaar (ed), *Research Handbook on Emissions Trading Systems* (Edward Elgar 2016). However, Madema argues that 'the transferable permits system has little in common with the bilateral bargaining discussion emphasised

rights system of pollution control for air,[129] and John Dales for water.[130] In Coasean jargon, thus, a cap-and-trade system is an institution (a set of institutions) designed to economise on transaction costs. It institutes the 'missing market' that is at the heart of Hardin's 'tragedy of the commons'.[131] As a market, it restricts access to the atmosphere, rations the access rights which are transferable, and directs resources to their highest use.

Dales outlined the basic structure of the market consisting of a cap, a system of allocating the pollution rights, and transferable pollution rights as follows:

> The government's decision is, let's say, that for the next five years no more than x equivalent tons of waste per year are to be discharged into the waters of region A. Let it therefore issue x pollution rights and put them up for sale, simultaneously passing a law that everyone who discharges one equivalent ton of waste into the natural water system during a year must hold one pollution right throughout the year. (…) Firms that found that their actual production was likely to be less than their initial estimate of production would have rights to sell, and those in the contrary situation would be in the market as buyers. (…) The virtues of the market mechanism are that no person, or agency, has to set the price—it is set by the competition among buyers and sellers of rights.[132]

Crocker-Dales' idea of creating a market for pollution rights was first put to the test in the United States (US) when Congress established in 1989 a cap-and-trade programme to reduce sulphur dioxide (SO_2) emissions.[133] The SO_2 programme proved, by and large, successful and inspired successive carbon markets.[134] The

in "The Problem of Social Cost"'. See SG Madema, 'The Curious Treatment of the Coase Theorem in the Environmental Economics Literature: 1960-1979' (2014) 8 Review of Environmental Economics and Policy 39, 43.

129 TD Crocker, 'The Structuring of Atmospheric Pollution Control Systems' in H Wolozin (ed), *The Economics of Air Pollution* (Norton 1966).

130 JH Dales, *Pollution, Property, and Prices* (University of Toronto Press 1968).

131 J Leitzel, *Concepts in Law and Economics: A Guide for the Curious* (Oxford University Press 2015) 14-15. See also DR Helm and DW Pearce, 'Economic Policy towards the Environment: An Overview' in DR Helm (ed) *Economic Policy towards the Environment* (Blackwell 1991) 8-10.

132 Dales (n 130) 801.

133 Nentjes and Woerdman (n 115) 2.

134 Nentjes and Woerdman (n 115) 7-8.

European Union launched in 2005 the EU Emissions Trading Scheme (EU ETS) – the largest carbon market in the world. Although the EU ETS remains the biggest carbon market, other major ETSs include the Swiss ETS (since 2008), the New Zealand ETS (since 2008), the Regional Greenhouse Gas Initiative (RGGI) in north-east United States (since 2009), the Californian ETS (since 2013), the Quebec ETS (since 2012), the Korean ETS (since 2015), and several sub-national pilot ETSs in China (since 2015).[135]

With the increase in the number of ETSs in regions as diverse as Europe, North America, and the Asia-Pacific, linking them to one another has been discussed in both academic and policy circles since the early 2000s. The subsequent Sections focus on the literature on linking ETSs. It starts by defining linking and identifying its different types.

2.3. Linking: definition and taxonomy

Two or more ETSs are considered as linked if at least one of them recognises and accepts, directly or indirectly, the emissions units issued by the other scheme(s) as valid instruments of compliance in its domestic jurisdiction.[136] At the core of this definition lies an understanding that in autarky each linking-partner jurisdiction defines and uses its own distinct emissions units. After linking, the emissions units of the linking-partner ETSs become fungible, allowing covered entities in an ETS to use the carbon units of the linking-partner ETSs for compliance purposes without requiring 'individual review and approval prior to each transaction.'[137]

An issue related to the definition of linking concerns how to characterise multi-jurisdictional ETSs such as the EU ETS and RGGI. Pohlmann, for instance, characterises the EU ETS during Phase I (2005-2007) and Phase II (2008-2012) as 'a system of 30 largely independent, but inter-linked national emissions trading

[135] SE Weishaar, *Emissions Trading Design: A Critical Overview* (Edward Elgar 2014) 66-98.

[136] Haites E, 'Harmonization between National and International Tradable Permit Schemes' (OECD 2003) 5, CATEP Synthesis Paper <http://www.oecd.org/env/cc/2957623.pdf> accessed 8 November 2016; RN Stavins and J Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions: Opportunities, Implications, and Challenges' (IETA 2007) Report for International Emissions Trading Association <http://belfercenter.hks.harvard.edu/files/IETA_Linking_Report.pdf> accessed 7 December 2015.

[137] B Görlach, MA Mehling and E Roberts, 'Designing Institutions, Structures and Mechanisms to Facilitate the Linking of Emissions Trading Schemes' (German Emissions Trading Authority 2015) 15 (reference omitted).

schemes.'[138] Görlach and his colleagues argue, on the other hand, that the EU ETS could more appropriately be characterised as 'a single ETS covering several jurisdictions'.[139] Pohlmann's characterisation of the EU ETS as an 'inter-linked' system is primarily based on the decentralised nature of the ETS during its formative phases and the discretion enjoyed by national authorities in making key decisions.[140] By contrast, Görlach and his colleagues characterise the EU ETS as multi-jurisdictional because Member States 'have agreed to facilitate cross-border trading in one and the same [European Union Allowance]' and that the use of a uniform carbon currency 'strongly indicates the existence of a single ETS covering several jurisdictions.'[141] The upshot of this is that the characterisation varies depending on the criteria one applies to distinguish a (single and coherent) multinational ETS and a system of multilaterally linked ETSs.[142]

Linking comes in different shapes and forms, each having various economic and environmental consequences. A general distinction is made between direct and indirect linking.[143] A direct linking is established if an ETS accepts the emission units of another ETS as valid instruments of compliance.[144] A direct linking could either be unilateral, bilateral or multilateral depending on the number of participating ETSs and direction of the flow of allowances between the linking-partner jurisdictions. In

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138 M Pohlmann, 'The European Union Emissions Trading Scheme' in D Freestone and C Streck (eds), *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and beyond* (Oxford University Press 2009) 343. See also JB Skjærseth and J Wettestad, *EU Emissions Trading: Initiation, Decision-Making and Implementation* (Ashgate 2008) 155.

139 Görlach, Mehling and Roberts (n 137) 16.

140 Although all national regulatory authorities adhered to certain common rules, procedures and guidelines, Member States had autonomy over cap setting, allocations of emissions allowances, operation of registries, enforcement and determining the quantitative limits to the use of offset credits. Pohlmann (n 138) 343-344.

141 Görlach, Mehling and Roberts (n 137) 16.

142 This dissertation, following Görlach and his colleagues′ approach, makes a conceptual distinction between a multijurisdictional ETS and a system of linked ETSs based on the emissions units the relevant jurisdictions use. The need for linking ETSs arises due to a lack of fungibility between different emissions units. If different jurisdictions define and use a uniform carbon currency, the jurisdictions need not enter into an agreement for mutually recognising each other's carbon currencies. In a linked ETS, on the other hand, linking-partner jurisdictions must establish mechanisms for mutually recognising each other's emissions units as alternative instruments of compliance in their respective jurisdictions.

143 Jaffe, Ranson and Stavins, 'Linking Tradable Permit Systems' (n 109) 795-796; A Tuerk and others, 'Linking Carbon Markets: Concepts, Case Studies and Pathways' (2009) 9 Climate Policy 341, 343.

144 Tuerk and others (n 144) 343.

a direct unilateral linking, an ETS recognises the emission units of another ETS or a crediting mechanism such as the Clean Development Mechanism (CDM), but not *vice versa*. The flow of allowance is unidirectional, hence the name unilateral linking. Because several ETSs accept some types of credits from the Kyoto's CDM, there is a unilateral link between these ETSs and the CDM.[145]

A direct bilateral linking involves two ETSs, and each ETS recognises the emission units of the other linking partner, resulting in a two-way flow of allowances.[146] The two-way linking between the Californian and Quebec ETSs is an example of direct bilateral linking.[147] A direct multilateral linking is similar to direct bilateral linking except that the former involves more than two ETSs. In contrast to a direct link, an indirect linking can be established even if neither of the linking-partner ETSs recognises each other's allowances. If several ETSs are unilaterally linked to a common third scheme, an indirect link emerges between them.[148] Although this does not create a direct linking between the individual ETSs, the ETSs compete for the same pool of allowances from the common third scheme and influence each other's allowance prices. For instance, because both the EU and New Zealand ETSs accept some types of credits from the CDM, they are indirectly linked to each other through the CDM. Similarly, if scheme A is bilaterally linked to scheme B which is also bilaterally linked to scheme C, an indirect linking is created between schemes A and C.

The form of the linking that ETSs establish determine the economic consequences of linking.[149] When two ETSs are bilaterally linked, allowance prices will rise in one market and fall in the other till prices fully converge, unless they are impeded by transaction costs and other trade restrictions. The convergence in allowance prices allows regulated entities first to exploit 'low-hanging fruits' spread across the linking-partner ETSs before utilising more expensive abatement options, lowering the overall costs of abatement.[150] Indirectly linked ETSs also influence each

[145] Ranson and Stavins, 'Post-Durban Climate Policy' (n 109) 407.

[146] M Ranson and RN Stavins, 'Linkage of Greenhouse Gas Emissions Trading Systems: Learning from Experience' (2016) 16 Climate Policy 284.

[147] Green, Sterner and Wagner (90) 1064.

[148] Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 136) 13-14.

[149] Ranson and Stavins, 'Post-Durban Climate Policy' (n 109) 407.

[150] Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 136); C Flachsland, R Marschinski and O Edenhofer, 'To Link or not to Link: Benefits and Disadvantages of

other's prices through a common third scheme, resulting in some convergence in their allowance prices.[151]

2.4. The economics of linking

Linking ETSs brings several economic and political benefits. It is not also without disadvantages. This Section reviews the near-term and long-term benefits of linking and concerns about linking.

2.4.1. Short-term benefits

The economic intuition behind emissions trading explains the short-run benefits of linking ETSs. Standard economic theory holds that a cap-and-trade scheme achieves a given emissions target at the lowest possible abatement cost.[152] The 'cap', coupled with a robust monitoring, reporting and verification (MRV) system and a credible compliance and enforcement system, limits the quantity of regulated greenhouse gases that covered entities emit over a period. The 'trade' allows the covered entities to shift abatement activities to entities with the lowest MAC. In equilibrium, the trade in emissions rights equalises regulated entities' MACs, a *sine qua non* for a cost-efficient realisation of an environmental target.

Without linking, allowance prices in one ETS are likely to be different from others, reflecting the difference in the costs of abatement that firms face in each jurisdiction and the value each jurisdiction attaches to the benefits of pollution reduction. The different allowance prices reflect a suboptimal situation in comparison to a case where each ETS freely trades in emissions allowances with others.[153] Linking ETSs connects previously isolated carbon markets and establishes an international

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Linking Cap-and-Trade Systems' (2009) 9 Climate Policy 358; Tuerk and others (n 144); G Gruell and L Taschini, 'Linking Emission Trading Schemes' [2012] Economics of Energy & Environmental Policy 31; Ranson and Stavins, 'Post-Durban Climate Policy' (n 109); Ranson and Stavins, 'Linkage of Greenhouse Gas Emissions Trading Systems' (n 146).

151 MA Mehling and E Haites, 'Mechanisms for Linking Emissions Trading Schemes' (2009) 9 Climate Policy 169, 171; R Dellink, S Jamet, J Chateau and R Duval, 'Towards Global Carbon Pricing: Direct and Indirect Linking of Carbon Markets' (2014) 6 OECD Journal: Economic Studies 209, 211; MA Mehling, 'Legal Frameworks for Linking National Emissions Trading Systems' in CP Carlarne, KR Gray and RG Tarasofsky (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press 2016) 260-261.

152 Tietenberg, *Emissions Trading* (n 115); Weishaar, *Emissions Trading Design* (n 135).

153 Babiker, Reilly and Viguier (n 122) 37.

trade in emissions allowances. The free trade in emissions allowances will increase allowance prices in some markets and decrease others until, in equilibrium, prices fully converge.[154] The cross-border trade in emissions allowances lowers total costs of abatement compared to autarky, benefiting all linking-partner jurisdictions.[155] The higher the divergence in the price of allowances between the linking-partner ETSs in autarky, the greater the gains (cost savings) from the inter-system trade in emissions rights. In sum, linking ETSs increases the gains from trade by creating new opportunities for trade that would otherwise remain untapped.

Although the primary benefit of linking is equalising carbon prices across the linking-partner ETSs, it also has other advantages. First, by enlarging carbon markets and increasing the number of buyers and sellers of allowances, linking increases liquidity and reduces price volatility that might otherwise destabilise individual ETSs.[156] The liquidity benefit of linking is crucial to small ETSs that inevitably face problems of liquidity due to their size. Linking helps regulated entities to spread abatement across space and creates a more liquid market (than a pre-linking scenario) that is more resilient to price shocks.[157]

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[154] Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 136); Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150); Tuerk and others (n 144); Gruell and Taschini (n 150); Ranson and Stavins, 'Post-Durban Climate Policy' (n 109); Ranson and Stavins, 'Linkage of Greenhouse Gas Emissions Trading Systems' (n 146).

[155] Although linking ETSs brings net benefits, it creates winners and losers in each linking-partner jurisdiction. See text to notes 174–175 below. In addition, the conclusion that linking ETSs benefits all linking-partner jurisdictions assumes a first-best world in which each linking-partner ETS operates in a perfectly competitive economic environment. As a result, emissions trading leads to optimal outcomes in both autarky and trade. If we dispense with this assumption, linking ETSs may not necessarily benefit all linking-partner ETSs. Babiker, Reilly and Viguier, for instance, show that for a linking-partner jurisdiction that becomes net-seller of allowances, the increase in allowance prices following linking may reinforce pre-existing distortions from inefficiently high fuel taxes, potentially leading to a loss in efficiency that may outweigh the benefits from trade. See generally Babiker, Reilly and Viguier (n 122).

[156] Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 136) 18; Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150) 361; W Sterk and R Schule, 'Advancing the Climate Regime through Linking Domestic Emissions Trading Systems' (2009) 14 Mitigation and Adaptation Strategies for Global Change 409, 411; Tuerk and others (n 144) 344.

[157] S Fankhauser and C Hepburn, 'Designing Carbon Markets. Part II: Carbon Markets in Space' (2010) 38 Energy Policy 4381. The issue of market stability, regulatory options to address demand-side shocks, and their implications for linking are discussed in Chapter 4 below.

Second, linking addresses issues of competitive distortion and carbon leakage that might arise due to different levels of pre-linking carbon prices.[158] Any sub-global attempt to address climate change (such as through national or regional ETSs) raises issues of competitiveness and carbon leakage because carbon-intensive production may flee (through industrial relocation, imports, and new investments) to regions without, or with less costly, climate policies.[159] A country's climate policy may thus encourage firms to shift their emissions to 'pollution havens' rather than reduce them locally. Central to issues of competitiveness and carbon leakage are different carbon prices in different jurisdictions. Linking addresses these by equalising carbon prices in the linking-partner jurisdictions, contributing to also addressing equity concerns arising from different carbon prices in different jurisdictions.[160]

The claim that linking between ETSs addresses issues of competitiveness and carbon leakage is valid with respect to competitiveness and leakage concerns that might arise from differential climate policy landscapes between the linking-partner ETSs. Concerning competitiveness and leakage concerns vis-à-vis third- jurisdictions – those that are not part of the linking arrangement – linking may reduce or exacerbate the problems depending on its impact on pre-linking allowance prices. Leakage from a linking-partner jurisdiction to third jurisdictions may increase/decrease if linking leads to an increase/decrease in the jurisdiction's pre-linking allowance prices.[161]

2.4.2. Long-term benefits

The potential long-term benefits of linking ETSs are arguably more important than its short-term efficiency gains. The long-term benefits of linking ETSs are both economic and political. Economically, linking ETSs may help improve the dynamic efficiency of linking-partner ETSs. Politically, it could create a bottom-up

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158 Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 136) 18; FG Tiche, SE Weishaar and O Couwenberg, 'Carbon Leakage, Free Allocation and Linking Emissions Trading Schemes' (2014) 8 Carbon and Climate Law Review 97, 101.

159 JW Coleman, 'Unilateral Climate Regulation' (2014) 38 Harvard Environmental Law Review 87. It is to be noted, however, that the theoretical debate on whether asymmetric climate policies cause carbon leakage is not settled. The empirical evidence is also mixed. See text to notes 215–229 below in Chapter 3.

160 S Rudolph, A Lerch and T Kawakatsu, 'Developing the North American Carbon Market: Prospects for Sustainable Linking' (2016) Discussion Paper E-16-009, Graduate School of Economics, Kyoto University <http://www.econ.kyoto-u.ac.jp/dp/papers/e-16-009.pdf> accessed 7 June 2017, 6.

161 Tiche, Weishaar and Couwenberg, 'Carbon Leakage' (n 158) 101.

and decentralised international climate policy architecture that may complement, lead to, or substitute the global climate policy architecture under the umbrella of the UNFCCC. Linking ETSs may also contribute towards addressing social justice issues associated with climate change. Each of these benefits is discussed below.

A linking between ETSs binds the linking-partner jurisdictions to each other. In this sense, linking serves as a commitment device and constrains the 'free' reign of regulatory authority by individual linking-partner jurisdictions.[162] The use of linking as an external institutional constraint has two advantages. First, it strengthens the political sustainability of the linking-partner ETSs by making policy reversal cumbersome and costly. Second, it may increase the dynamic efficiency of an ETS by locking in a long-term emissions targets.[163] Linking-partner jurisdictions' commitment to each other means that they are less likely to renege on their long-term emissions reduction targets than in a pre-linking scenario, providing a credible signal to private actors and helping to improve the dynamic efficiency of the respective jurisdictions' climate policies. Again, this analysis assumes that linking-partner jurisdictions will respect the terms of the linking agreement, which may not necessarily be true especially when the costs of defection and/or the probability of detection are low. Chapter 6 further explore these issues.

Politically, linking ETSs was predicted to play potentially three roles in building an international climate alliance.[164] First, a web of linking between regional, national and sub-national ETSs, coupled with unilateral emissions reduction commitments, might give rise to a bottom-up international climate alliance that might serve as a backup, albeit imperfect, in case the international climate policy process of the UNFCCC fails or drags on too long.[165] Second, linking between ETSs could encourage countries – by reducing aggregate abatement and compliance costs – to adopt more ambitious climate policy targets, hence serving as a stepping stone

[162] S Brunner, C Flachsland and R Marschinski, 'Credible Commitment in Carbon Policy' 12 Climate Policy 255, 256-257.

[163] Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150) 361.

[164] C Flachsland, R Marschinski and O Edenhofer, 'Global Trading versus Linking: Architectures for International Emissions Trading' (2009) 37 Energy Policy 1637, 1645; Jaffe, Ranson and Stavins, 'Linking Tradable Permit Systems' (n 109) 804-806; Ranson and Stavins, 'Linkage of Greenhouse Gas Emissions Trading Systems' (n 146).

[165] Flachsland, Marschinski and Edenhofer, 'Global Trading versus Linking' (n 164) 1645; Jaffe, Ranson and Stavins, 'Linking Tradable Permit Systems' (n 109) 804-805.

towards an ambitious global climate policy.[166] Finally, the cost-saving and other benefits of linking may prompt policy makers to consider including the existing linking in any future broader climate policy architecture.[167]

Rudolph and his colleagues argue that linking ETSs contributes towards addressing some of the social justice issues associated with climate change mitigation.[168] By reducing aggregate cost of abatement relative to autarky, linking ETSs lessens the cost burden of climate change mitigation on current generations, contributing towards addressing intergenerational equity issues.[169] The cost saving from trade in emissions allowances also allows rich countries to spare more cash to support climate change mitigation and adaptation efforts of developing countries, addressing intra-generational equity issues.[170]

2.4.3. Concerns about linking

Linking ETSs may not always have desirable consequences. In this Section, we discuss four disadvantages associated with linking. The first involves the uneven distribution of abatement with its co-benefits.[171] Because linking creates opportunities to shift abatement to wherever it could be achieved at the least possible cost, the geographical distribution of abatement activities might be uneven. With some jurisdictions undertaking more abatement than others, co-benefits associated with emissions reduction such as increased air quality, increased energy security, and incentives for investment and innovation in low-carbon carbon technologies will not be evenly distributed over the linking-partner jurisdictions.

Second, the cross-border trade in emissions allowances could create a contagion of localised price shocks from one ETS into other linking-partner ETSs.[172] Third, and related to the issue of regulatory autonomy, linking may undermine domestic

[166] Jaffe, Ranson and Stavins, 'Linking Tradable Permit Systems' (n 109) 805-806.

[167] Jaffe, Ranson and Stavins, 'Linking Tradable Permit Systems' (n 109) 803.

[168] Rudolph, Lerch and Kawakatsu (n 160) 6-7.

[169] Rudolph, Lerch and Kawakatsu (n 160) 6-7.

[170] Rudolph, Lerch and Kawakatsu (n 160) 6-7.

[171] Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150) 361-362.

[172] WJ McKibbin, A Morris and PJ Wilcoxen, 'Expecting the Unexpected: Macroeconomic Volatility and Climate Policy' (2008) Brookings Global Economy and Development Working Paper No. 28 <http://ssrn.com/abstract=1324938> accessed 7 December 2015; Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150) 361; Tuerk and others (n 144) 344.

policy priorities of the linking-partner jurisdictions. Not only does it couple a jurisdiction's decarbonisation efforts to an international carbon price that it cannot shape unilaterally, but it also limits its flexibility in pursuing local policy objectives either by requiring prior approval before certain regulatory measures are implemented or by removing certain policy options from the regulatory menu.[173] Either way, a jurisdiction is likely to enjoy less regulatory flexibility than in autarky.

Fourth, linking ETSs results in intra-system and inter-system redistribution of wealth, which may, in turn, undermine the environmental integrity of the linked ETSs. That linking ETSs has net benefits does not necessarily imply that the distribution of the benefits will be symmetric. Because allowance price convergence following linking results from an increase in pre-linking allowance prices in some jurisdictions and a decrease in others, linking redistributes wealth from net-buyers (net-sellers) to net-sellers (net-buyers) of allowances in jurisdictions where allowance prices increase (decrease) because of the linking. Similarly, linking also transfers wealth from jurisdictions that are net buyers of allowances to jurisdictions that are net sellers of allowances.[174] However, as Rehdanz and Tol point out, trade restrictions such as import quotas may reduce the incentive to relax a given ETS's emissions reduction targets.[175]

The concern is that the asymmetric distribution of benefits incentivises jurisdictions that expect to become net buyers of allowances after linking to improve their terms of trade by inflating/diluting their cap, creating a 'race to the bottom'.[176] If linking-partner jurisdictions start loosening their ETS caps in anticipation of an impending link, they will emit more aggregate GHG emissions post-linking than

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173 K Neuhoff, *Climate Policy after Copenhagen: The Role of Carbon Pricing* (Cambridge University Press 2011), 152.

174 Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150) 361-362; Green, Sterner and Wagner (n 107) 1066.

175 K Rehdanz and RSJ Tol, 'Unilateral Regulation of Bilateral Trade in Greenhouse Gas Emission Permits' (2005) 54 Ecological Economics 397. See also Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150) 362.

176 C Helm, 'International Emissions Trading with Endogenous Allowance Choices' (2003) 87 Journal of Public Economics 2737. For a different type of 'race to the bottom' phenomenon that may arise because of linking-partner jurisdictions monitoring, reporting and verification procedures, see S Borghesi and M Montini, 'Linking Emission Trading Schemes around the World: Critical Analysis and Perspectives' (2016), FESSUD Working Paper Series No 86 <http://fessud.eu/wp-content/uploads/2015/03/Linking-Emission-Trading-Schemes-around-the-world-critical-analysis-and-perspectives-working-paper-86.pdf> accessed 1 September 2016, 11.

would otherwise happen without linking, undermining the environmental integrity of the linked carbon market. The race to the bottom may also damage the credibility of linking as a free trade ideal.

In reality, linking-partner's incentive to strategically relax their respective cap is likely to be counterbalanced by other factors.[177] Relaxing an ETS's cap for short-term economic gains becomes less attractive if a given jurisdiction is bound by an international agreement that imposes economy-wide emissions reduction commitments. With a binding emissions reduction target, relaxing an ETS's cap shifts the burden of reducing those emissions to the non-ETS sectors, forcing the jurisdiction to weigh the benefits of relaxing the ETS cap against the costs of achieving the shifted emissions in the non-ETS sectors. Reputational incentives might also reduce linking-partner jurisdictions' incentive to manipulate their emissions reduction targets strategically.

2.5. Barriers to linking ETSs

The discussion on linking in the preceding Section mostly ignores the politics of market design, and by implication, that of linking. Much of the analysis (implicitly) assumes a linking between 'properly' designed cap-and-trade schemes with no significant design differences. In reality, existing ETSs vary along several of their design features, reflecting the diverse interests and preferences of their respective jurisdictions. In developing their respective ETSs, jurisdictions may go beyond (or even trade off) achieving the two objectives mostly associated with emissions trading – environmental effectiveness and cost effectiveness – and aim to realise additional goals in other subsystems such as energy and industry policies. When linked, the different design features and policy objectives interact, affecting the success of the linking in achieving a given emissions reduction target cost effectively. Also, that linking-partner jurisdictions may pursue different policy objectives ties linking negotiations to not just climate policy but also to other broad policy subsystems, rendering linking negotiations daunting.

In the remainder of this Section, we discuss if and how these institutional aspects of ETSs impede linking. The discussion is organised into three broad categories. Sections 2.5.1 and 2.5.2 discuss, respectively, the implications of design differences for the environmental integrity and efficiency and equity/fairness of a linked carbon

[177] See Tuerk and others (n 144).

market. Section 2.5.3 examines if and how differences in policy priorities between the linking-partner jurisdictions might erect barriers for linking.

2.5.1. Environmental integrity and cost effectiveness concerns

A successful linking achieves the aggregate emissions reduction target of the linking-partner ETSs at the least possible abatement cost, i.e. it is both environmentally effective and efficient. If different design differences between the linking-partner ETSs undermine either of these, it is likely that they would pose challenges for linking.[178] Design differences relating to credibility and stringency of enforcement systems, offset eligibility requirements, the nature of the emissions targets, and cost-containment measures are considered to undermine environmental effectiveness and/or cost effectiveness, posing the most serious challenges for linking.[179]

If either of the linking-partner ETSs lacks a stringent enforcement mechanism, there is no guarantee that the alleged emissions reductions are indeed realised. This is both inefficient and environmentally ineffective. It undermines environmental integrity because the alleged emissions reduction might not have been realised. It is inefficient because it misrepresents the true level of scarcity of emissions allowances, distorting the carbon price signal and resulting in suboptimal investment decisions by market participants.[180]

Differences in offset eligibility requirements are related to a wider issue of definition and recognition of emissions units.[181] Several jurisdictions impose restrictions on the use of offset credits, and the type and stringency of the limitations vary across jurisdictions (see Chapter 5 on offsets). If offset credits accepted in one ETS are excluded in the linking-partner ETS, covered entities in the former could comply with the offset credits and free up corresponding 'regular' emissions units which they could sell to covered entities of the latter, circumventing the offset

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[178] See for instance A Roßnage, 'Evaluating Links between Emissions Trading Schemes: An Analytical Framework' (2008) 4 Carbon & Climate Law Review 394, 395; MJ Mace and J Anderson, 'Legal and Design Issues Arising in Linking the EU ETS with Existing and Emerging Emissions Trading Schemes' (2009) 6 Journal for European Environmental and Planning Law 197; Tuerk and others (n 144).

[179] Mace and Anderson, 'Legal and Design Issues' (n 178) 217-220; Sterk and Schule (n 156) 417; Tuerk and others (n 144) 346-349.

[180] Mace and Anderson, 'Legal and Design Issues' (n 178) 220; Sterk and Schule (n 156) 419; Tuerk and others (n 144) 348.

[181] See for instance Sterk and Schule (n 156) 416-417.

eligibility requirements of the latter. Several authors argue that this constitutes a serious impediment for linking.[182] As discussed in Chapter 5, we doubt this conclusion. We argue that different offset eligibility requirements do not necessarily lead to a worse environmental integrity situation than in a pre-linking scenario.

Differences concerning the type of the linking-partner ETS' emissions reduction targets may raise environmental effectiveness and cost-effectiveness concerns.[183] With respect to emissions reduction targets of ETSs, a distinction is generally made between absolute and relative targets. An absolute emissions target imposes a fixed cap on the quantity of greenhouse gases that regulated entities could emit over a compliance year. A cap-and-trade system is a good example. An ETS with a relative target couples the level of emissions over a period to a unit of output, input, energy consumption, or gross domestic product. Unlike an absolute target, a relative target accommodates the possibility of an increase in emissions if the corresponding unit of measurement also increases.

A linking between a cap-and-trade scheme and another scheme with a relative target may undermine both environmental integrity and cost effectiveness. Post-linking emissions level may exceed emissions level in a pre-linking scenario if, for instance, an increase in demand for allowances in the cap-and-trade scheme leads covered entities in the system with a relative target to increase their output to a level that might not happen without the linking. Also, a relative emissions target necessarily requires an *ex post* adjustment of the number of allowances to account for the actual level of, for instance, output in a given period. The *ex post* correction of supply of allowances might create a liquidity shock, with repercussions for the interconnected carbon market.[184]

Finally, cost-containment measures (such as borrowing, price floor, and price cap) create another set of challenges for linking.[185] The concern with cost containment

[182] See for instance W Blyth and M Bosi, 'Linking Non-EU Domestic Emissions Trading Schemes with the EU Emissions Trading Scheme' (OECD/IEA 2004) 20 <http://www.oecd.org/env/cc/32181382.pdf> accessed 7 December 2015; Sterk and Schule (n 156); Tuerk and others (n 144) 348.

[183] Mace and Anderson, 'Legal and Design Issues' (n 178) 219-220; Sterk and Schule (n 156) 417-418; Tuerk and others (n 144) 348.

[184] J Ellis and D Tirpak, 'Linking GHG Emission Trading Systems and Markets' (OECD/IEA 2006) <http://www.oecd.org/env/cc/37672298.pdf> accessed 7 December 2015; Sterk and Schule (n 156) 417; Tuerk and others (n 144) 348.

[185] Mace and Anderson, 'Legal and Design Issues' (n 178) 218-219; Sterk and Schule (n 156) 419-420.

measures involves the propagation of one ETS's cost-containment measures into a linking-partner's ETS. In a linking between an ETS that bans borrowing and another that allows borrowing, the borrowing provisions of the latter propagate into the former, allowing regulated entities of the former to borrow from future compliance periods.[186] Similarly, a linking between an ETS with a price floor and a price ceiling to an ETS that uses neither results in the latter *de facto* operating under the price floor and price ceiling of the former.

2.5.2. Fairness/equity issues

A linking that is environmentally effective and that brings collective welfare gains may not necessarily be fair to all stakeholders in the linking-partner jurisdictions, triggering political opposition to linking. Fairness/equity concerns may arise because of or independent of linking. The former category includes the intra-system and inter-system redistribution of wealth resulting from linking between ETSs. The latter category concerns equity/fairness issues arising from design differences relating to, for instance, the sectoral coverage and allowance allocation rules of the linking-partner ETSs.

The level of linking-partners' emissions reduction targets affects the wealth redistribution implications of linking. Because the intersystem trade in allowances shifts abatement to wherever it could be achieved at the least possible cost, a jurisdiction with a less stringent emissions target and/or a lower MAC – both compared to another linking-partner jurisdiction – will receive net wealth transfers from the latter. The wealth transfer from one jurisdiction to another might be politically difficult to justify to domestic constituencies not least because the co-benefits of emissions abatement such as increased air quality are also enjoyed by those jurisdictions receiving the net wealth transfers. Especially if the linking is between ETSs in a developed and developing countries, the size of the wealth transfer is likely to be high because abatement costs in developing countries are likely to be significantly low.

The intra-system redistribution of wealth is a by-product of the uniform carbon price that prevails after linking. Because the post-linking allowance price results from an increase in pre-linking allowance prices in one jurisdiction and a decrease in the other, linking creates winners and losers in each of the linking-partner jurisdictions.

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[186] Tuerk and others (n 144) 348-349.

In jurisdictions where allowance prices increase, net-sellers of allowances gain and net-buyers of allowances and consumers of emissions-intensive products or services lose.[187] The converse holds true in jurisdictions where linking results in a decrease in allowance prices. Interest groups that will be worse off (better off) than in a pre-linking scenario are likely to lobby against (for) linking. If the interest groups that will lose out because of linking wield more political clout than those gaining from linking, this may lead to political barriers for linking.

Issues of equity/fairness may also arise independently of linking. These include that some sectors are covered in one ETS but excluded from a linking-partner ETS; that entities covered under one ETS buy their allowances while entities in a linking-partner ETS receive them free of charge; or new entrants and closing entities receive a more favourable treatment in one ETS than in a linking-partner ETS. Although such differential treatments are results of the design choices of the linking-partner jurisdictions – as such independent of linking – covered entities in the ETS with a less favourable ETS may demand similar treatment on the grounds of fairness.[188] As Tuerk and his colleagues argue fairness concerns arising from significant differences in linking-partner ETS' emissions reduction targets are likely to constitute one of the most critical challenges for linking.[189]

2.5.3. Issues of shared-sovereignty

When two or more jurisdictions agree to link their respective ETS to one another, they will have to outline institutional and governance arrangements that support the linked carbon market. At the bare minimum, the linking arrangement must provide that the linking-partner jurisdictions recognise each other's emissions allowances as alternative instruments of compliance in their respective jurisdictions.[190] Linking-partner jurisdictions will also have to put in place governance structures to manage matters of mutual concern (see the discussion in Section 2.6). These governance structures mean that each linking-partner jurisdiction will have to seek the acquiescence of the other partners before taking regulatory measures that also affect the other linking-partners, creating a form of shared/pooled sovereignty whereby

[187] See, for instance, Rudolph, Lerch and Kawakatsu (n 160) 6.

[188] Sterk and Schule (n 156) 417-419; Tuerk and others (n 144) 346-347.

[189] Tuerk and others (n 144) 347-348.

[190] Görlach, Mehling and Roberts (n 137) 16.

each jurisdiction cedes a part of its sovereignty over its respective ETS.[191]

As discussed in Section 2.4.2, the shared-sovereignty is instrumental in enhancing the political sustainability of an ETS and increasing its dynamic efficiency. The flip side of this, however, is that it creates regulatory inflexibility and ties a jurisdiction's climate policy ambitions to the acquiescence of other linking-partner jurisdictions. These policy objectives may relate to incentivising technological development, promoting economic growth, generating government revenue from the sale of allowances, or supplementarity–that a share of the overall abatement should be realised at home.[192] Because different jurisdictions are likely to have different policy objectives, the relevant question for our discussion is whether differences in policy priorities impede linking.

If the policy objectives of the linking-partner jurisdictions are inconsistent, pursuing one may require sacrificing (part of) the other. This can be illustrated by taking two linking-partner jurisdictions with different policy priorities. Assume that the first jurisdiction prioritises economic growth and the second, technological development. The first jurisdiction is likely to contain carbon prices within an 'acceptable' range, while the latter is likely to favour high carbon prices to incentivise innovation and investment in low-carbon technologies. Post-linking, realising both policy priorities is inherently difficult. The jurisdiction that prefers high and predictable carbon prices is thus likely to find a linking with an ETS that dilutes its carbon price signal a too-high price to pay for linking.

It is unlikely that the issue of shared-sovereignty raises concerns if the linking-partner jurisdictions pursue broadly similar policy priorities. However, it is not uncommon for jurisdictions' policy priorities to evolve and change over time. This could lead to divergence in the policy priorities of the linking-partner jurisdictions over time, creating similar problems as in the static sense and threatening the sustainability of the linking. These issues can be addressed through governance structures that linking-partner jurisdictions could establish as part of their linking agreement. This is discussed in the next Section.

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[191] R Garnaut, *The Garnaut Climate Change Review: Final Report* (Cambridge University Press 2008) 228. See also S Borghesi, M Montini and A Barreca, *The European Union Emission Trading System and Its Followers: Comparative Analysis and Linking Perspectives* (Springer 2016) 96.

[192] Roßnage (n 178); Flachsland, Marschinski and Edenhofer, 'To Link or not to Link' (n 150); Tuerk and others (n 144) 349-350; Weishaar, *Emissions Trading Design* (n 135).

2.6. Coordinating linking

Even after linking-partner jurisdictions address outstanding issues relating to environmental effectiveness, economic efficiency, equity and regulatory autonomy, there remains the daunting task of implementing the link and putting in place institutions and governance arrangements to support the day-to-day functioning of the carbon market and to sustain it over time. This Section discusses governance structures and institutions that may be required to sustain an environmentally credible and economically efficient linked carbon market.

2.6.1. Forms of linking

As explained in Section 2.3, bilaterally linking two ETSs requires each linking-partner jurisdiction recognising the emissions units of the other as valid instruments of compliance.[193] Absent recognition of 'foreign' emissions units as alternative instruments of compliance, no linking is possible. There are different avenues that two or more jurisdictions could link their carbon markets and recognise each other's emissions units.[194]

In a unilateral link, an ETS could establish the link with another carbon market by simply including the emissions units of the 'foreign' carbon market to the catalogue of carbon currencies recognised for compliance purposes.[195] Depending on the constitutional law requirements of the relevant jurisdiction and the manner in which the ETS was established, recognising foreign units for compliance purposes might require a formal legislative amendment.[196] Absent such constitutional requirement, the recognition could be realised by adjusting the technical rules such as registry regulations.[197] While unilateral linking need not require the consent of the 'foreign' jurisdiction, this may become necessary if the foreign jurisdiction does not allow non-residents to maintain accounts to hold and transfer emissions allowances.

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193 See text to notes 136–142 above.

194 MJ Mace and J Anderson, 'Transnational Aspects of a Linked Carbon Market' (2008) 2 Carbon and Climate Law Review 190, 193-194; Mehling, 'Legal Frameworks for Linking' (n 151) 267.

195 Görlach, Mehling and Roberts (n 137) 17; Mehling, 'Legal Frameworks for Linking' (n 151) 267-268.

196 Görlach, Mehling and Roberts (n 137) 17.

197 Görlach, Mehling and Roberts (n 137) 17.

A (bilateral/multilateral) linking between ETSs can be established in either of the following ways: (i) the linking-partner jurisdictions specifying in an agreement that they recognise each other's emissions units as alternative instruments of compliance in their respective jurisdictions; or (ii) through the mutual reciprocal commitments of the linking-partner jurisdictions embedded in their respective domestic laws.[198] The first option envisages a linking agreement that is formal and binding (such as a treaty) or informal and non-binding (such as a memorandum of understanding). The second option offers the possibility of establishing linking without the need to enter into an agreement – formal or otherwise.[199] The linking hinges on the political commitments of each linking-partner jurisdiction.

The form of the linking arrangement influences linking-partner jurisdictions' calculus for compliance and the flexibility that they enjoy within the arrangement. Formal and binding arrangements increase the costs of exit, make *ex post* reneging costly, and increase states' incentive to make *ex ante* agreement-specific investments.[200] This makes them more credible than informal and non-binding linking agreements. On the other hand, informal and non-binding agreements offer greater flexibility, can be entered between parties incapable signing of international treaties, and rarely require a legislative endorsement to take effect.

While it is necessary that linking-partner jurisdictions recognise each other's carbon units as instruments of compliance to establish bilateral/ multilateral linking, it is not sufficient to sustain a credible link. The need for and the types of governance structures are discussed next.

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198 MA Mehling, 'Bridging the Transatlantic Divide: Legal Aspects of a Link between Regional Carbon Markets in Europe and the United States' (2007) 7 Climate Law Reporter 46, 47; Mace and Anderson, 'Transnational Aspects of a Linked Carbon Market' (n 194) 194; Mace and Anderson, 'Legal and Design Issues' (n 178) 225-231; Mehling and Haites (n 151) 176; Görlach, Mehling and Roberts (n 137) 18-19. See also A Prag, G Briner and C Hood, 'Making Markets: Unpacking Design and Governance of Carbon Market Mechanisms' (OECD/IEA 2012) Climate Change Expert Group Paper No. 2012(3) <http://dx.doi.org/10.1787/5k43nhks65xs-en> accessed 4 September 2016, 29-40; C Haug, M Frerk and M Santikarn, 'Towards a Global Price on Carbon: Pathways for Linking Carbon Pricing Instruments' (Adelphi 2015) 21, Background Report to Inform the G7 Process <https://www.adelphi.de/en/publication/towards-global-price-carbon-pathways-linking-carbon-pricing-instruments> accessed 23 October 2016.

199 Mace and Anderson, 'Legal and Design Issues' (n 178) 227-228.

200 Mace and Anderson, 'Legal and Design Issues' (n 178) 226; TL Meyer, Power, Exit Costs, and Renegotiation in International Law' (2010) 51 Harvard International Law Journal 379, 395-396.

2.6.2. Governance institutions and structures

ETSs are dynamic systems. They must adapt to changing circumstances such as a shift in political actors' interests and preferences, new information about climate change and abatement options, unforeseen circumstances such as demand-side shocks, and international climate change diplomacy. Adaptation often requires changing 'old' design features or adding new institutional features. In autarky, the effect of these changes is likely to be limited to actors within the relevant jurisdiction. With linking, however, linking-partner jurisdictions are affected by each other's policy choices.

Absent institutions and governance structures that go beyond those already in place at the domestic level, unilateral policy interventions by linking-partner jurisdictions may lead to market fragmentation, compromise environmental integrity, and reduce cost-effectiveness.[201] Also, as will be discussed in Chapter 4, uncoordinated policy responses to similar challenges may fuel market instability.[202] Linking also brings with it governance challenges that may not arise in autarky. There is, for instance, a concern that linking might provide an incentive to each linking-partner jurisdiction to set a less stringent emissions reduction target than its partners to maximise its short-term economic gains, undermining the environmental integrity of the linked carbon market and upsetting the bargain that linking-partner jurisdictions set at the time of the linking agreement.[203]

Irrespective of its form, a linking arrangement has to put in place institutions and governance structures that, in addition to supporting the day-to-day functioning of the linked carbon market, coordinate periodic changes to the linking-partner ETSs, manage unforeseen circumstances such as macroeconomic changes, and establish procedures accession of new members and exit of existing members.[204] The governance structures could range from informal regulatory cooperation between the linking-partner jurisdictions to establishing an autonomous supranational organisation with extensive powers including determining the jurisdictions' emissions reduction pathways, managing allowance supply dynamically, allocating

[201] Mehling and Haites (n 151) 179.

[202] See Section 4.4.1 below in Chapter 4..

[203] See text to notes 176–177 above. See also Mehling and Haites (n 151) 179.

[204] See for instance MA Mehling, 'Global Carbon Market Institutions: An Assessment of Governance Challenges and Functions in the Carbon Market' (DECC 2009) 14-21, Background Paper prepared for the Department of Energy and Climate Change <http://climatestrategies.org/publication/global-carbon-market-institutions>; Mehling and Haites (n 151); Tuerk and others (n 144) 351-354.

allowances, and overseeing the overall functioning of the linked carbon markets.[205]

The informal regulatory cooperation approach, while flexible, is unlikely to be adequate to address governance challenges arising from linking. Establishing an independent supranational agency also seems politically unrealistic as this requires linking-partner jurisdictions to cede sovereignty on almost every aspect of their carbon policy. It is likely that governance structures of linking would initially take the form of a basic formal agreement specifying, for instance, the mutual recognition of emissions units, a common electronic registry, and a combined periodic auctioning schedule. As jurisdictions build confidence in each other's performance over time, they may add supranational institutional structures to address common challenges.

2.7. Summary

In summary, the linking literature could be categorised into three generations. The first generation theoretically underpinned linking ETSs by outlining the expected benefits and costs of linking. A common thread of the early literature is one of enthusiasm about linking ETSs as mechanism of driving down costs of abatement, reducing price volatility and creating a bottom-up international climate policy architecture that could complement or lead to an international climate policy architecture under the UNFCCC.

The second generation of the literature sketched prospects and challenges for linking ETSs. The analysis in this strand of the literature focused on whether different design features of ETSs pose barriers to linking. Whether different design features pose barriers to linking was assessed based on the likely effects of prototypical design variants of ETSs for economic efficiency, environmental integrity, competitiveness and fairness. This strand of the literature underscored that the expected benefits and costs of linking ETSs depend crucially on the manner in which the linking-partner ETSs are designed.

The third generation of the linking literature has started bringing in real-life ETSs into the discussion on barriers to linking ETSs. Although this strand of the literature echoes the themes of the second generation, it differs along important lines. First, it accounts for subtle design differences that the early literature could not

[205] See for instance Mehling and Haites (n 151); S Goers and B Pfluglmayer, 'Post-Kyoto Global Emissions Trading: Perspectives for Linking National Emissions Trading Schemes with the EU ETS in a Bottom-up Approach' (2012) 3 Low Carbon Economy 69, 78.

account for. Second, the politics of linking ETSs has featured prominently in the analysis. Third, it moved the discussion from analysing prospects and challenges of linking to include issues of governing linked ETSs.

In tune with the third generation of the linking literature, the upcoming Chapters discuss the welfare effects of linking ETSs by taking real-life ETSs as case studies. Our analysis, however, differs in one important aspect: it is positivist in nature. It examines if and how the manner in which linking-partner ETSs are constructed affect the economic efficiency and environmental integrity of a linked carbon market. It leaves out the question of whether concerns relating to economic efficiency or environmental integrity identified in our analysis are likely or unlikely to impede linking the relevant ETSs.

3
Carbon Leakage, Free Allocation and Linking[206]

3

3.1. Introduction

Where the coverage of an emissions trading system (ETS) is sub-global, covered installations face a higher cost of production, *ceteris paribus,* than similar plants in countries without, or with less stringent, emissions constraints. The concern is that, in a world of unequal carbon prices, carbon-intensive production may flee to regions without costly climate policies.[207] Also, if a carbon price induces a shift away from fossil fuels, the price of fossil fuels may decrease, prompting an increase in their consumption in countries where stringent climate regulations are lacking.[208] A sub-global ETS could thus threaten competitiveness and lead to 'carbon leakage', where emissions are simply transferred rather than reduced.

The empirical evidence supporting leakage caused by the asymmetric climate policy landscape is, at best, mixed.[209] Leakage and competitiveness concerns, perceived or real, have, however, attracted policymakers' attention. Of the seventeen

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206 A shorter version of this chapter was published as FG Tiche, SE Weishaar and O Couwenberg, 'Carbon Leakage, Free Allocation and Linking Emissions Trading Schemes' (2014) 8 Carbon and Climate Law Review 97.

207 Z Zhang, 'Competitiveness and Leakage Concerns and Border Carbon Adjustments' (2012) 6 International Review of Environmental and Resource Economics, 228-229.

208 Zhang (n 207) 228-229.

209 A Dechezleprêtre and M Sato, 'The Impacts of Environmental Regulations on Competitiveness' (2014) 13, Grantham Research Institute on Climate Change and the Environment and Global Green Growth Institute Policy Brief <http://www.lse.ac.uk/GranthamInstitute/publication/the-impacts-of-environmental-regulations-on-competitiveness> accessed 8 December 2015.

ETSs currently in force, all but the Regional Greenhouse Gas Initiative (RGGI) distribute varying levels of allowances free of charge to regulated entities that are deemed to face risks of competitiveness and leakage.[210] The system of allocating allowances free of charge differs from jurisdiction to jurisdiction.

Differences in allocation systems are considered in the linking literature as unlikely to hinder linking.[211] This is because, first, differences in the rules of allowance allocation are independent of linking, and, second, the efficiency and environmental effectiveness characteristics of an ETS are separate from the system of distributing allowances. The latter claim is in line with Coase's insight that if property rights are properly defined, and that negotiation is costless, bilateral negotiation achieves optimal allocation of resources irrespective of the initial allocation of allowances.[212] However, as one moves from a frictionless world to the world where transaction costs are positive, institutions that determine the initial distribution of property rights will have welfare effects.[213] In the world of positive transaction costs, efficient allocation of resources depends on how the laws and institutions that underpin the market transactions are designed.

This Chapter seeks to explain how, and in what ways, differences in competitiveness and leakage safeguards affect linking ETSs by taking the EU ETS and the Australian Carbon Pricing Mechanism (CPM) as case studies. Whereas both the EU ETS and the Australian CPM use(d) free allocation of allowances as a primary mechanism of addressing competitiveness and leakage concerns, their rules of allocation vary along several lines. Some of the differences include the basis for the free allocation, the rate of assistance to emissions-intensive trade-exposed (EITE) sectors, and the scope of the free allocation.

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210 See International Carbon Action Partnership (ICAP), 'Emissions Trading Worldwide: International Carbon Action Partnership Status Report 2016' (ICAP 2016) 29-67.

211 See, for instance, MJ Mace and J Anderson, 'Legal and Design Issues Arising in Linking the EU ETS with Existing and Emerging Emissions Trading Schemes' (2009) 6 Journal for European Environmental and Planning Law 197; A Tuerk and others, 'Linking Carbon Markets: Concepts, Case Studies and Pathways' (2009) 9 Climate Policy 341, 347.

212 RH Coase, 'The Problem of Social Cost' (1960) 3 Journal of Law & Economics 1, 8.

213 C Veljanovski, Economic Principles of Law (Cambridge University Press 2007) 52-53. See also RH Coase, 'The Relevance of Transaction Costs in the Economic Analysis of Law' in F Parisi and CK Rowley (eds), *The Origins of Law and Economics: Essays by the Founding Fathers* (Edward Elgar 2005).

The Chapter is structured into five Sections. Section 3.2 discusses the economics of asymmetric climate policy and explains the context in which competitiveness and leakage issues arise. Section 3.3 describes leakage-preventing measures of the EU ETS and the Australian CPM. Section 3.4 analyses if and how the respective schemes' leakage-preventing measures affect linking. Section 3.5 outlines the major conclusions.

3.2. Competitiveness and carbon leakage concerns

The global climate policy landscape is decidedly asymmetric.[214] The uneven climate policy landscape entails that firms engaging in carbon-intensive production face different emissions constraints in different jurisdictions. The effect of uneven environmental policies on firms' competitiveness have long been debated, with two hypotheses – the pollution haven hypothesis and the Porter hypothesis – dominating the discussion.[215] The pollution havens hypothesis posits that an increase in trade liberalisation increases global emissions levels by inducing firms producing emissions-intensive goods to relocate from the country with tight emissions constraint to the country with lax (or no) emissions constraints.[216] In autarky, producing emissions-

[214] The Paris Agreement instituted legal obligations on both developed and developing countries in contributing towards limiting global warming to below 2 degrees Celsius by the turn of the century. The near universal coverage of the Agreement, 195 countries and the EU, does not, however, level the 'playing field'. To begin with, the Agreement still incorporates elements of 'common but differentiated responsibilities'. Whereas developed countries are expected to 'take the lead' by setting absolute economy-wide emissions reduction targets, developing countries are 'encouraged to move over time' towards absolute economy-wide emissions reduction/limitation targets. Also, the bottom-up structure of the Agreement, with each country outlining measures it intends to take towards achieving the global target, entails that some countries' emissions reduction commitments are bound to be more ambitious than others. While a milestone in the global fight against climate change, the Paris Agreement will not eliminate asymmetries from the international climate policy landscape. See generally *Paris Agreement*, opened for signature 22 April 2016 (entered into force 4 November 2016).

[215] Dechezleprêtre and Sato (n 209) 6-7. See also M Faure, 'Does Environmental Law Matter' in M Faure and J Smits (eds), *Does Law Matter? On Law and Economic Growth* (Intersentia 2011) 395-401.

[216] The hypothesis is based on the following assumptions: two jurisdictions that are symmetrical except for the level of environmental policy; a free trade in goods; no strategic use of environmental policy; and a first best world of no externalities. See MS Taylor, 'Unbundling the Pollution Haven Hypothesis' (2005) University of Calgary Department of Economics Working Paper 2005-15, 3-6, <https://econ.ucalgary.ca/sites/econ.ucalgary.ca/files/u58/wp05-15.pdf> accessed 26 November 2016. See also WJ Baumol and WE Oates, *The Theory of Environmental Policy* (2nd edn, Cambridge University Press 1988) 258-266; MS Taylor and BR Copeland, 'Trade, Growth, and the Environment' (2004) 4 Journal of Economic Literature 7.

intensive goods is relatively expensive in the jurisdiction with tight emissions constraints, and relatively cheap in the country with lax (or without) emissions restrictions.[217] With trade liberalisation firms producing emissions-intensive goods relocate to the country with lax emissions constraints, leading to a rise in global emissions levels because the most emissions-intensive firms locate in the country with the laxest emissions restrictions.[218]

The contrasting view on the competitiveness effects of uneven environmental regulation was put forward by Michael Porter.[219] Porter hypothesised that well-designed environmental policies foster innovation and deployment of cleaner technologies that 'may partially or more than fully offset the costs of complying with them.'[220] The hypothesis questions the view that firms, as profit-maximising entities, will innovate without even an environmental regulation if doing so can be profitable. Porter and van der Linde argue that in a world where technological opportunities are changing, information is imperfect, and incentives may be split due to, for instance, agency problems, environmental regulation plays several roles in spurring innovation.[221]

First, it signals to firms about potential resource inefficiencies and technological improvements. Second, regulation focused on information gathering raises corporate awareness and can lead to environmental improvement. Third, regulation reduces uncertainties about the prospects of environment-friendly investments. Fourth, regulation creates pressure that motivates innovation by fostering creative thinking and mitigating agency problems. Fifth, regulation provides a buffer until cost-effective new technologies become available by ensuring that firms play by the same rules.

Whether asymmetric environmental policies harm or improve competitiveness is, in the end, an empirical question. Neither the pollution haven hypothesis nor the Porter hypothesis has significant coherent empirical support.[222] Jaffe and others,

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[217] Taylor (n 241) 4.

[218] Taylor (n 241) 4

[219] ME Porter, 'Towards a Dynamic Theory of Strategy' (1991) 12 Strategic Management Journal 95; ME Porter and C van der Linde, 'Toward a New Conception of the Environment-Competitiveness Relationship' (1995) 9 The Journal of Economic Perspectives 97, 98.

[220] Porter and van der Linde (n 219) 98.

[221] Porter and van der Linde (n 219) 99-100.

[222] Faure (n 215) 397-401; Dechezleprêtre and Sato (n 209) 16-17.

who reviewed the early empirical literature on the pollution haven hypothesis, concluded that 'there is relatively little evidence to support the hypothesis that environmental regulations have had a large adverse effect on competitiveness.'[223] Twenty years later, Dechezlepretre and Sato reach a similar conclusion that 'the overall conclusion has changed only slightly … [and that] there is no case to cut back environmental regulations for competitiveness reasons.'[224] Although there is significant evidence suggesting that environmental regulation triggers innovation in greener technologies,[225] the cost-saving from the innovation is not significant enough to fully offset its costs.[226]

In general, the competitiveness impacts of different emissions constraints could be mitigated or aggravated by a host of factors including the carbon-intensity of the specific products, affected industries' ability to pass through the carbon costs to consumers and the availability of cost-effective abatement options.[227] Intuitively, highly emissions-intensive industries face higher carbon costs than less emissions-intensive industries. Competitiveness and leakage concerns are acute within sectors and sub-sectors that shoulder high carbon costs but are unable to pass through these

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[223] AB Jaffe and others, 'Environmental Regulation and the Competitiveness of US Manufacturing: What Does the Evidence Tell Us?' (1995) 33 Journal of Economic Literature 132, 157. The results from the empirical analysis stand in contrast to ex ante leakage estimates that range from five per cent to 130 per cent. See S Droege and others, 'Tackling Leakage in a World of Unequal Carbon Prices' (Climate Strategies 2009) <http://climatestrategies.org/publication/tackling-leakage-in-a-world-of-unequal-carbon-prices> accessed 8 December 2015. See also S Droege, 'Using Border Measures to Address Carbon Flows' (2011) 11 Climate Policy 1191.

[224] Dechezleprêtre and Sato (n 209) 18.

[225] For a review of the relevant literature, see D Popp, RG Newell and AB Jaffe, 'Energy, the Environment, and Technological Change' in BH Halland and N Rosenberg (eds), *Handbook of the Economics of Innovation- Vol-II* (Academic Press 2010); S Ambec and others, 'The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness?' (2013) 7 Review of Environmental Economics and Policy 2-22.

[226] See, for instance, P Lanoie and others, 'Environmental Policy, Innovation and Performance: New Insights on the Porter Hypothesis' (2011) 20 Journal of Economics and Management Strategy 803.

[227] M Sato and L Mohr, 'A Small Number of Sectors are Potentially Affected' in K Neuhoff and F Matthes (eds), *The role of auctions for emissions trading* (Climate Strategies 2008) 25-27; JE Aldy and WA Pizer, 'The Competitiveness Impacts of Climate Change Mitigation Policies' (2011) 4, NBER Working Paper No. 17705 <http://www.nber.org/papers/w17705> accessed on 23 February 2017; T Hausotter, S Steuwer and D Tänzler, 'Competitiveness and Linking of Emission Trading Systems' (German Federal Environment Agency 2011) 8-9, Report No. (UBA-FB) 001447/E <http://www.uba.de/uba-info-medien-e/4051.html> accessed 8 December 2015.

costs without losing market share or profits.[228] The design of the particular climate policy instrument also affects competitiveness and carbon leakage by influencing the availability of cost-effective abatement options. In the framework of emissions trading, for instance, the smaller the carbon market and the tighter the intertemporal flexibility between trading periods, the higher will be the impact of the carbon price on competitiveness.[229]

The limited empirical support for the incidence of carbon leakage notwithstanding, competitiveness and leakage concerns continue to be divisive in climate policymaking. As a result, domestic climate policies often include one or several leakage and competitiveness safeguards. The next Section describes leakage-preventing measures implemented within the framework of the EU ETS and the Australian CPM.

3.3. Leakage safeguards: EU ETS and Australian CPM

Both the EU ETS and the Australian CPM use free allocation of allowances to EITE entities as the primary policy measure to address competitiveness and leakage concerns. In this Section, we summarise the respective schemes' systems of free allocation.

[228] Firms' ability to pass on these costs depends, *inter alia,* on the elasticity of demand, the market structure in which they are operating, and their trade exposure. If demand for their products is relatively inelastic, companies will have more room to pass through the carbon costs to their consumers. On the other hand, where demand is elastic, a slight increase in prices is likely to lead to consumers' switching to cheaper substitutes. Companies facing an elastic demand thus have to decide either to pass along the carbon costs and risk losing market share or to shoulder the carbon prices and face a reduced profit margin. See F Matthes, 'What Makes a Sector with Significant Cost Increase Subject to Leakage?' in K Neuhoff and F Matthes (eds), *The role of auctions for emissions trading* (Climate Strategies 2008); Sato and Mohr (n 227) 25-26; Hausotter, Steuwer and Tänzler (n 227) 29-30. The electricity sector has long been considered as less prone to carbon leakage not only because its large physical assets make relocating to other jurisdictions in response to a carbon price costly but also because electricity generators are able to pass on the costs of carbon to their consumers. However, Weishaar and Madani show why the EU electricity sector is not immune to what they call 'electricity carbon leakage' - carbon leakage from the electricity sector. Their analysis suggests that electricity carbon leakage from the EU could happen to adjacent countries – Moldova and Ukraine – for a carbon price as low as €13/tCO2. See SE Weishaar and S Madani, 'Energy Community Treaty and the EU Emissions Trading System: Evidence of an Unrecognized Policy Conflict' (2014) 12 Oil, Gas & Energy Law Intelligence 1.

[229] S Fankhauser and C Hepburn, 'Designing Carbon Markets. Part I: Carbon Markets in Time' (2010) 38 Energy Policy 4363, 4363–4370; S Fankhauser and C Hepburn, 'Designing Carbon Markets. Part II: Carbon Markets in Space' (2010) 38 Energy Policy 4381, 4381–4387.

3.3.1. Allowance allocation in the EU ETS

In the third trading phase of the EU ETS (2013-2020) and beyond, auctioning is the default mode of allocation. The electricity sector, except power plants in the Eastern European Member States, faces full auctioning as of 2013.[230] Non-electricity sectors receive varying levels of freely allocated allowances based on Community-wide harmonised allocation rules.[231]

The harmonised free allocation rules set out four variables as the basis for the free allocation: *ex ante* benchmarks, a historical activity level, a carbon leakage exposure factor, and a cross-sectoral correction factor or linear factor. The benchmarks are, to the extent possible, product-specific.[232] They reflect the average of the 10 per cent most efficient installations in terms of emissions-intensity in the EU in the 2007/2008 period in particular sectors and sub-sectors.[233] The benchmarks are multiplied by an installation's historical activity level to determine the preliminary annual number of allowances. The historical activity level reflects the average of an installation's median activity levels over 2005-2008 or 2009-2010, whichever is higher.[234]

Once the preliminary annual number of allowances is calculated, it is then adjusted according to the carbon leakage exposure of the relevant installations. The carbon leakage exposure factor for the EITE sectors and sub-sectors is set at 1.00 for all years of the third trading period. EITE sectors and sub-sectors will thus receive all their allowances free of charge provided that they meet the *ex ante* benchmarks. Non-EITE sectors' leakage exposure factor starts with 0.8 in 2013 and decreases to 0.3 in 2020.[235]

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[230] See Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the community [2009] OJ L140/63, arts 10a(1) and 10c (hereafter: Revised Emissions Trading Directive).

[231] Revised Emissions Trading Directive, art 10a.

[232] Revised Emissions Trading Directive, art 10a(1).

[233] Revised Emissions Trading Directive, arts 10a(2) & 10a(12).

[234] Commission Decision of 27 April 2011 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council, [2011] OJ 2003 L130/1, art 9(1) (hereafter: Harmonised Free Allocation Rules).

[235] Revised Emissions Trading Directive, art 10a(11); Harmonised Free Allocation Rules, annex VI.

The preliminary annual number of allowances may also be adjusted by a cross-sectoral correction factor to ensure that the freely allocated allowances do not exceed the maximum amount of free allocation specified by art 10a(5) of the ETS Directive.[236] Also, the number of allowances allocated – for free or via auctions – declines at a reduction factor of 1.74 per cent per *annum* corresponding to the overall emissions reduction target.[237]

New entrants into EITE sectors get the same level of free allocation as existing firms. A new-entrant reserve is set up corresponding to 5 per cent of the annual community-wide free allocation.[238] Plant closure results in no allocations as of the year following the cessation of operations. Unlike the previous phases, the transfer of allowances from a closing facility to a new replacement facility is not allowed as of 2013.[239]

3.3.2. Allowance allocation in the Australian CPM

The Australian CPM covered approximately 400 of Australia's biggest emitters. It commenced in July 2012 as a fixed-price scheme and, after three years, it will

[236] In September 2013, the Commission announced, as required by art 15(3) of the Harmonised Free Allocation Rules, the cross-sectoral correction factors applicable for phase III (2013-2020) of the EU ETS. The Commission uniformly applies the cross-sectoral correction factors and reduces the number of freely allocated allowances if Member States' provisional free allocation of allowances exceeds the maximum amount specified by art 10a(5) of the ETS Directive. A number of firms in Austria, Italy, and the Netherlands challenged the validity of their respective national authorities' provisional free allocations for Phase III and, indirectly, the Commission's cross-sectoral correction factors, which determines the maximum number of allowances that could be allocated during this period. The Court of Justice of the European Union, to which the cases were referred by national courts for preliminary ruling, found the cross-sectoral correction factors set by the Commission in 2013 as invalid. As a result, the Commission issued a new Decision on 24 January 2017 outlining modified cross-sectoral correction factors. See Revised Emissions Trading Directive, art 10a(5); Harmonised Free Allocation Rules, art 15(3); Commission Decision (EU) 2017/126 of 24 January 2017 amending Decision 2013/448/EU as regards the establishment of a uniform cross-sectoral correction factor in accordance with Article 10a of Directive 2003/87/EC of the European Parliament and of the Council, [2017] OJ L 19/94, art 1 and annex; Joined Cases C-191/14 , C-192/14, C-295/14, C-389/14 and C-391/14 to C-393/14 *Borealis Polyolefine GmbH and Others v Bundesminister für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft and Others* [2016] OJ C 243/6.

[237] Revised Emissions Trading Directive, art 9.

[238] Revised Emissions Trading Directive, art 10a (7).

[239] DA Ellerman, F Convery and C de Perthuis, *Pricing Carbon: The European Union Emissions Trading Scheme* (Cambridge University Press 2010) 78.

transition to flexible prices.[240] Australia sells the majority of allowances initially at a fixed price and afterwards via auctions. EITE industries receive freely allocated allowances through a Jobs and Competitiveness Program (JCP).[241]

The free allocation is based on three factors: an assistance rate for a given year, the output level for that year, and the baselines for the relevant activity.[242] The assistance rate varies according to the emissions intensity of a particular activity. The higher an industries' emissions intensity, the more the number of free allowances it receives in absolute terms. In 2012/13 allocation year, the assistance rate was 94.5 per cent for highly emissions intensive activities and 66 per cent for moderately emissions intensive activities.[243] The rate declines at 1.3 per cent per *annum*.[244]

The second factor is industries' actual production levels in a given allocation year. This element contrasts with the EU ETS' free allocation system that takes into account installations' historical output. In the Australian CPM, the allocation of allowances was made early in each compliance period based on an entity's previous financial year production levels. The allocation is then adjusted in the subsequent compliance year for any over- or under-allocation to account for actual production.[245] The level of free allocation thus increases with an increase in EITE entities' output, and *vice versa*. Also, unlike the EU ETS, the level of free allocation is not capped.[246]

The third factor concerns the emissions baselines for the relevant activity. Separate baselines are set for every activity's (a) direct emissions intensity, (b) electricity use and (c) natural gas feedstock use in undertaking a relevant activity. The baselines are based on industry weighted average emissions, electricity usage, and natural gas feedstock usage assessed during the baseline period of 2006/07 and 2007/08.[247] The baselines thus ensure that EITE industries are compensated for both their direct and indirect emissions.

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[240] L Caripis and others, 'Australia's carbon pricing mechanism' (2011) 2 Climate Law 583, 585.

[241] Clean Energy Amendment Regulation 2012 (No 1) 2012 (Cth) (hereafter: Clean Energy Amendment Regulation). See also Commonwealth of Australia, *Securing a Clean Energy Future: The Australian Government's Climate Change Plan* (Australian Government 2011) 53-56.

[242] Clean Energy Amendment Regulation, cls 906-907; Commonwealth of Australia, *Securing a Clean Energy Future* (n 241) 104-115.

[243] Clean Energy Amendment Regulation, cl 907.

[244] See Explanatory Memorandum, Clean Energy Bill 2011 (Cth), ch 5.18 (hereafter: Explanatory Memorandum).

[245] Commonwealth of Australia, *Securing a Clean Energy Future* (n 241) 114.

[246] Explanatory Memorandum, ch 5.23; See also Revised Emissions Trading Directive, art 10a(5).

[247] Commonwealth of Australia, *Securing a Clean Energy Future* (n 241) 77.

New entrants into EITE activities receive the same level of assistance as incumbents except that allocation to new entrants is capped. If a plant that received allowances free of charge closed down, it would be required to return the carbon units for the production that did not occur in the respective financial year.[248]

3.4. Leakage, free allocation and linking

At the heart of the issues of competitiveness and leakage is the lack of a uniform carbon price across the globe. Could linking, by equalising carbon prices across the linking-partner jurisdictions, eliminate the need for implementing measures addressing leakage and competitiveness concerns? If the unilateral leakage-preventing measures are maintained, how do they affect linking? Both questions are addressed below.

3.4.1. Leakage and linking

Bilateral or multilateral linking could resolve competitiveness and leakage issues between the linking-partner jurisdictions by equalising carbon prices across the linking-partner jurisdictions and ensuring that firms across the interconnected market face a uniform carbon price.[249] This could avoid the problems arising from the interaction of different leakage-preventing measures in the linking-partner jurisdictions.

Leakage to third jurisdictions could, however, increase or decrease depending on, all else equal, whether allowance prices increase or decrease due to linking.[250] If linking leads to an increase in allowance prices relative to autarky, leakage to third jurisdictions could increase. On the other hand, if linking leads to a decrease in allowance prices relative to a pre-linking level, the competitiveness effects of the carbon price will decrease, and leakage to third jurisdictions will be less than under a pre-linking scenario.

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248 Commonwealth of Australia, *Securing a Clean Energy Future* (n 241) 135.

249 RN Stavins and J Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions: Opportunities, Implications, and Challenges' (IETA 2007) 38, Report for International Emissions Trading Association <http://belfercenter.hks.harvard.edu/files/IETA_Linking_Report.pdf> accessed 7 December 2015.

250 Tuerk and others (n 211) 344. See also A Tuerk, 'The Challenge of the European Carbon Market: Emission Trading, Carbon Leakage and Instruments to Stabilise the CO_2 Price: Implications of Linking on Leakage' (2011) 9, WIFO Working Paper No. 410 <www.wifo.ac.at/en/pubma_entries?detail-view=yes&publikation_id=43105> accessed 8 December 2015.

In the context of the EU ETS and the Australian CPM, bilateral linking would lead to a significant decrease in the Australian CPM's allowance price and only a relatively small increase in the EU ETS allowance price.[251] This would mean that leakage to third jurisdictions could decrease in Australia and remain more or less the same in the EU. Given that the link with the EU ETS will significantly decrease Australian CPM's allowances prices and that China – Australia's biggest trading partner – is putting a price on carbon, Australia may be encouraged to reduce its industry assistance through the free allocation of allowances, thereby resolving some of the allocation-related issues discussed above.

3.4.2. Free allocation and linking

Free allocation rules of the EU ETS and the Australian CPM differ in some aspects. These relate to the basis for free allocation (benchmarking that is coupled with historical activity levels in the EU *vs.* industry average baselines that are coupled with actual activity levels in Australia),[252] the rate of assistance (up to 100 per cent in the EU *vs.* up to 94.5 per cent in Australia),[253] the reduction factor (1.74 per cent per *annum* in the EU *vs.* 1.3 per cent in Australia),[254] the level of free allocation (capped in the EU *vs.* uncapped in Australia),[255] and the scope of assistance (for direct costs only in the EU *vs.* both for direct and indirect costs in Australia).[256] Do these differences affect linkage between the EU ETS and the Australian CPM?

Differences in allowance allocation systems are not considered as major obstacles for linking.[257] Even freely allocated allowances have opportunity costs as

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[251] Although Australia and the EU agreed in July 2012 to link their respective ETSs starting in 2015, the Australian CPM was repealed before the linking agreement took effect. Commission, 'Australia and European Commission agree on pathway towards fully linking Emissions Trading Systems' European Commission (Brussels, 28 August 2012) <http://europa.eu/rapid/press-release_IP-12-916_en.htm?locale=en> accessed 8 November 2016. The announcement of the linking agreement led to a significant decrease in the Australian expected carbon price for 2015 (from A$29 to just A$12.1). Point Carbon, 'Australia Takes A$6 Billion Write-down after EU CO2 Price Fall' Thompson Reuters (Oslo, 24 May 2013) <http://www.pointcarbon.com/polopoly_fs/1.2386086!cmanz20130524.pdf> accessed 11 February 2014.

[252] Revised Emissions Trading Directive, arts 10a(1) and 10c; Explanatory Memorandum, ch 5.7.

[253] Revised Emissions Trading Directive, art 10a(11); Explanatory Memorandum, ch 5.17.

[254] Revised Emissions Trading Directive, art 9; Explanatory Memorandum, ch 5.18.

[255] Revised Emissions Trading Directive, art 10a(5); Explanatory Memorandum, ch 5.23.

[256] See text to note 264 below; Commonwealth of Australia, *Securing a Clean Energy Future* (n 241) 77.

[257] Tuerk and others (n 211) 347; D Burtraw and others, 'Linking by Degrees: Incremental Alignment

each freely procured allowance that is surrendered could have been sold.[258] Modes of allocation should thus in principle not affect production decisions and thereby competitiveness. But the devil is in the details. The next Sections analyse if and how the efficiency, equity, competitiveness, and environmental effectiveness of an EU-Australian carbon market could be affected by the different systems of free allocation.

(a) Allocation baselines and benchmarks: efficiency considerations

The bases for the free allocation of allowances are *ex ante* benchmarks in the EU ETS and average baselines in the Australian CPM. Whereas the EU ETS' benchmarks reflect the average efficiency of the EU's 10 per cent most efficient installations producing a relevant product, the Australian CPM's baselines reflect the average of an entire industry engaging in a relevant activity.

In the EU ETS, EITE entities that meet the benchmarks, i.e. those that are among the top 10 per cent most efficient installations, receive all the allowances they need free of charge.[259] These entities may not improve efficiency if they expect that the benchmarks will be tightened to reflect efficiency improvements realised over time.[260] Any efficiency improvement realised in the current trading period would then affect their future allocation as they will likely be taken as the basis for setting new benchmarks. They will thus not abate (improve efficiency) unless the price of allowances exceeds the sum of their current marginal abatement cost (MAC) and the value of future allowances forgone by undertaking abatement (improving efficiency) today.

EITE installations that do not meet the benchmarks, notwithstanding the possibility of updating of the benchmarks, are better off improving efficiency if this is cheaper than buying allowances. They will do so until they reach the efficiency

of Cap and Trade Markets' (2013) 13, Resources for the Future DP 13-04 <http://ssrn.com/abstract=2249955> accessed 1 September 2016; S Borghesi and M Montini, 'Linking Emission Trading Schemes around the World: Critical Analysis and Perspectives' (2016) 16, FESSUD Working Paper Series No 86 <http://fessud.eu/wp-content/uploads/2015/03/Linking-Emission-Trading-Schemes-around-the-world-critical-analysis-and-perspectives-working-paper-86.pdf> accessed 1 September 2016.

[258] E Woerdman, O Couwenberg and A Nentjes, 'Energy Prices and Emissions Trading: Windfall Profits from Grandfathering?' (2009) 28 European Journal of Law and Economics 185, 187.

[259] Revised Emissions Trading Directive, arts 10a(2) and 10a(12).

[260] K Neuhoff, K Martinez and M Sato, 'Allocation, Incentives and Distortions: The Impact of EU ETS Emissions Allowance Allocations to the Electricity Sector' (2006) 6 Climate Policy 73, 75-77.

level of the current most efficient installations. As any future updating of the current benchmarks will likely take into account efficiency improvement within the 'top performers', abatement (efficiency improvement) within the 'less efficient installations' does not affect the latter's future allocations. Once they reach the efficiency level of the current most efficient installations, abating does not pay off anymore unless the price of allowances exceeds their MAC and the expected value of emission units forgone by further efficiency improvements.

In the Australian CPM, updating the baselines will affect the entire EITE industry rather than just a subset of the installations as is the case in the EU ETS. If the baselines are tightened, the number of freely allocated allowances per regulated entity will decrease because the baselines are set by taking the average of an entire EITE industry.[261] An EITE entity will thus be less inclined to improve, for instance, its emissions intensity unless the price of emissions units exceeds its MAC and the value of future emissions units forgone by undertaking abatement currently. The possibility of updating thus 'forces' EITE entities to place a value on an allowance that is higher than their MAC.

Not only does the updating affect innovation (dynamic efficiency) by distorting investment decisions, it also affects the cost-saving potential of the respective schemes.[262] If a firm expects that its current abatement behaviour affects its future allocations, if it is a seller, it will not be willing to sell allowances unless allowance prices exceed the sum of its MAC and the expected value of allowances that it will forgo by reducing output or undertaking abatement currently. If it is a buyer, it will be willing to pay a premium price that is well above its MAC. This 'higher than MAC' valuation of an allowance increases the costs of achieving an emissions reduction target.

Given the possibility of updating, a bilateral link between the Australian CPM and the EU ETS may not necessarily shift abatement to a system where it could be achieved at the least cost.[263] If Australian EITE entities have a lower MAC than EU

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261 Commonwealth of Australia, *Securing a Clean Energy Future* (n 241) 77.

262 See Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 249) 38-39.

263 The implications of the Australian CPM's free allocation system for the interconnected carbon market are likely to be more pronounced than that of the EU ETS'. The former's allocation system affects all EITE entities while the latter's impact is limited only to the most efficient installations. The discussion is thus limited to linking implications of the Australian CPM's free allocation rules.

ETS entities, they will still buy allowances from the EU ETS until prices exceed the sum of their MAC and the expected value of future allowances that are forgone by undertaking abatement currently. This will shift abatement from a system with lower MAC (Australia) to a system with a higher MAC (EU ETS). If Australian EITE entities have a higher MAC than EU ETS EITE entities, the former are better off buying allowances from the EU ETS. In this circumstance, shifting abatement to the EU ETS is efficient. Even then, they will be willing to pay a premium price as their valuation of allowances does not necessarily reflect their MAC.

If the Australian CPM were unilaterally linked to the EU ETS, Australian entities would shift abatement to the EU ETS (more abatement in the EU) although the former might enjoy a lower MAC. As the prices of allowances in the Australian CPM do not solely reflect regulated firms' MAC, the firms will (depending on circumstances) be willing to import allowances from the EU ETS (a shift in abatement from Australia to the EU) even if abating domestically might be more efficient. In both the unilateral and bilateral linking scenario, even if the intersystem trading in allowances is mutually beneficial to the parties involved in the transactions, it does not necessarily lead to a full realisation of societal cost-savings. Linking may not thus work the way it should.

(b) Allocation baselines and benchmarks: equity issues

The EU ETS benchmarks cover direct emissions only. No free allocation is thus made for indirect emissions.[264] The Australian CPM's free allocation system, by contrast, covers both direct and indirect emissions by setting separate baselines for emissions-intensity, electricity use and natural gas feedstock use in undertaking an EITE activity. The Australian CPM's free allocation system is thus in practice more generous than that of the EU ETS regarding the number of allowances handed out to EITE firms.

This difference in the scope of free allocation does not affect the efficiency of a linked EU-Australian carbon market. Irrespective of the quantity of freely allocated allowances, regulated entities make a decision, *ceteris paribus,* to abate or to buy allowances based on their MAC and the price of allowances. However, if the

[264] Member States are allowed to compensate EITE industries for their electricity costs in accordance with the EU state aid rules. EITE industries are not, however, guaranteed that they will indeed receive the compensation. See Revised Emissions Trading Directive, art 10a(6).

Australian entities can pass on all or part of their carbon cost to consumers, they will enjoy a higher windfall profit than their European competitors. In that case, the perception that Australian entities benefit from a more generous free allocation system may trigger lobbying from the EU ETS' EITE sectors for a similar system.

Moreover, because the size of the windfall profit depends partly on the price of allowances and because linking affects the carbon price in the linking-partner jurisdictions,[265] the equity issue is directly affected by linking. Given the currently very low carbon prices in the EU ETS and since Australia will be a price-taker in any linking scenario, allowance prices will likely drop in Australia after linking. The size of the windfall profit that Australian EITE industries could get would thus decline after linking. If Australian entities are able to pass on the carbon costs, they may lobby against the linking as any link with the EU ETS will likely slash their expected profit. This may change once the prices increase in the EU ETS as a result of, for instance, economic growth, allowance price regulation such as an auction reserve price or a price floor.

(c) Historical versus actual output: Competitiveness effects

The EU ETS uses historical output whereas the APCPM uses actual output to allocate free allowances to EITE entities. This may have competitiveness implications in case of linking. The Australian CPM's output-based free allocation scheme, by linking the number of free allowances that a firm receives to its production level, discourages reducing emissions or output even if doing so would be more efficient. This mode of free allocation accommodates future growth and thereby dispels competitiveness concerns.[266] It is a *de facto* production subsidy as firms with higher level of output are awarded more allowances.[267] The free allocation in the EU ETS, by contrast, is a lump sum subsidy which should not affect operational decisions.[268] Unlike Australian EITE entities, EITE entities in the EU ETS cannot influence their allocation by increasing or decreasing output.

[265] Tuerk and others (n 211) 343-344.

[266] Neuhoff, Martinez and Sato (n 260) 75-77.

[267] D Burtraw and others, 'The Effect of Allowance Allocation on the Cost of Carbon Emission Trading' (2001) 29, Resource for the Future Discussion Paper 01-30 <http://www.rff.org/RFF/documents/RFF-DP-01-30.pdf> accessed 8 December 2015; Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 249) 37.

[268] Ellerman, Convery and de Perthuis (n 239) 86-87.

The actual value of the Australian *de facto* subsidy depends on the price of allowances. Linking, by affecting pre-linking carbon prices, thus affects the effective size of the subsidy. Given the currently very low carbon prices in the EU ETS, Australian CPM's link with the EU ETS, whether unilateral or bilateral, will likely decrease pre-linking carbon prices in the Australian market thereby also reducing the magnitude of the perverse incentives arising from the Australian CPM's free allocation scheme. Because the linking will reduce Australian EITE entities' expected benefits from their future allocation, they may lobby against linking.

(d) Output-based allocation: Environmental effectiveness

Environmental effectiveness of an ETS depends on an emissions target and a robust monitoring and compliance system. As far as the emissions target is set at a socially desirable level and it is properly enforced, the mechanisms through which emissions rights are distributed should not affect its integrity. Also, a link between two cap-and-trade systems with different modes of allowance allocation (e.g. auctioning *vs.* free allocation) does not affect emissions level as the linked system's total emissions will be equal to the aggregate number of allowances issued under each system. After linking, abatement shifts from one trading system into another and this does not affect the pre-linking combined emissions levels.

However, a link between two ETSs could affect aggregate emissions if either of them lacks an absolute cap. The Australian CPM lacks an absolute cap as its free allocation system is coupled with EITE entities' actual production levels in a given compliance year.[269] The free allocation of allowances is thus not capped, and it increases when relevant industries increase their output.[270] Depending on whether a bilateral link between the Australian CPM and the EU ETS increased or decreased allowance prices in the former, aggregate emissions from the Australian CPM and the EU ETS would be lower or higher than a pre-linking scenario.

If linking reduces allowance prices in the Australian CPM, Australian EITE firms would enjoy a reduction in one of their input costs, shifting, *ceteris paribus,* the supply curve in their product market to the right, i.e. increasing the equilibrium output (with associated emissions) relative to the autarky equilibrium. Compared to the pre-linking scenario, aggregate emissions will thus rise as the Australian

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[269] Clean Energy Amendment Regulation, cls 906 and 907.

[270] Commonwealth of Australia, *Securing a Clean Energy Future* (n 241) 104-115.

government will have to issue more allowances to account for the increased production. On the other hand, an increase in allowance prices in the Australian CPM as a result of linking would increase input costs of Australian EITE firms, shifting the supply curve in their product market to the left and decreasing the equilibrium output. Hence a post-linking allowance price increase would lead to a lower level of output and thereby lower emissions than in a pre-linking scenario.

(e) New entrant and closure provisions

The EU ETS' and Australian CPM's rules of allowance allocation to new entrants are different. In the EU ETS, new entrants into EITE sectors face the same product-specific benchmarks that are set with reference to the most efficient installations in the EU. In the Australian CPM, on the other hand, new entrants benefit from a more generous output-based allocation scheme. The Australian allocation system is thus more attractive than that of the EU. In principle, this may bias, *ceteris paribus*, investment decisions towards Australia.

If an installation that received free allowances closes down in the EU ETS, free allocation ceases as of the next compliance year from the year the installation closed down. In Australia, by contrast, plant closure entails surrendering freely allocated allowances for the production that is not realised in the same compliance year already. Closure rules of these kinds are widely recognised as inefficient as they create the perverse incentive to keep inefficient installations running as far as the return from selling surplus allowances is greater than the loss from keeping the inefficient installations.[271] The perverse incentive is stronger in the Australian CPM as closure affects allocations made for the year the plant closes, in addition to future allocations.

The new entrant and closure rules may not, however, be major obstacles for linking. First, the perverse incentives created by the new entrant and plant closure provisions are not the result of linking. They will continue to exist even in the absence of linking. Also, given the currently very low carbon prices in the EU ETS, the role of the provisions in distorting investment and closure decisions is likely to be marginal even in the absence of linking. It is, however, expected that EU ETS firms will lobby for an allocation scheme similar to the Australian CPM as that gives them more allowances.

[271] Ellerman, Convery and de Perthuis (n 239) 114-116; A Nentjes and E Woerdman, 'Tradable Permits versus Tradable Credits: A Survey and Analysis' (2012) 6 International Review of Environmental and Resource Economics 1, 24.

3.5. Conclusion

A sub-global ETS risks harming competitiveness and causing carbon leakage. These concerns cast doubt on the efficiency and environmental effectiveness of a unilateral climate policy. ETSs implemented thus far include measures to address competitiveness and leakage concerns. Analysis of the EU ETS's and the Australian CPM's leakage-preventing measures shows that certain differences give rise to efficiency, competitiveness, equity, and environmental effectiveness concerns.

If the current allocation baselines and benchmarks are updated for the upcoming trading periods, it may distort current abatement and investment decisions. It could raise the costs of meeting the emissions targets in both jurisdictions. In the case of linking, abatement may not necessarily be optimally shifted to a jurisdiction where it could be achieved at the least cost possible.

Second, because the Australian CPM's allocation baselines are more generous than that of the EU ETS, Australian EITE entities will likely reap higher windfall profits, all else being equal, than their EU competitors not necessarily because they are more competitive but because they receive more valuable allowances free of charge which they could sell. Although this is independent of linking, it may trigger lobbying by EU ETS EITE entities for a similar allocation system.

Third, the Australian CPM's free allocation system is a *de facto* production subsidy. By influencing allowance prices, linking will affect the size of the subsidy that Australian EITE industries get from the allocation system. A link with the EU ETS would slash the size of their subsidy as allowance prices are expected to drop in Australia. This may trigger opposition against the linking by the EITE entities. Finally, linking between the EU ETS and the Australian CPM could lead to more emissions than a pre-linking scenario if it leads to lower allowance prices in the Australian CPM and Australian EITE entities are facing a relatively elastic demand.

Whether and how these concerns will influence the outcome of linking negotiations depend on a host of factors embedded in the domestic politics of the linking-partner jurisdictions. Because international cooperation (such as linking) and domestic politics are inextricably intertwined, linking-partner jurisdictions will likely formulate their policy positions on linking by taking into account the likely reactions of their internal constituencies and political institutions.[272] For future research, case-specific analyses of the interests and ideas of domestic political and societal actors and institutions are needed to determine how the efficiency, competitiveness, equity, and environmental integrity concerns play out in the domestic arena and how this will affect linking, and vice versa.

272 H Milner, *Interests, Institutions, and Information: Domestic Politics and International Relations* (Princeton University Press 1997); R Putnam, 'Diplomacy and Domestic Politics: The Logic of Two-Level Games' (1998) 42 International Organisation 427; K Harrison and L Sundstrom, 'Introduction: Global Commons, Domestic Decisions' in K Harrison and L Sundstrom (eds), *Global Commons, Domestic Decisions: The Comparative Politics of Climate Change* (MIT Press 2010).

4
Carbon Market Stabilisation Measures and Linking[273]

4

4.1. Introduction

Allowance price volatility has been a recurring challenge in emissions trading systems (ETSs).[274] In April 2006, the price of European Union Allowances (EUAs) – the primary carbon currency of the EU ETS – crashed from nearly €30/tCO_2 to less than €13.31/tCO_2 after it became apparent that verified emissions were less than the number of allowances allocated to regulated entities.[275] Although the allowance price recovered and reached near €30/tCO_2 at the beginning of the second trading phase (2008-2012), it has started declining in late 2008 due partly to the European economic crisis.[276] Allowance prices have since not broken the €10/tCO_2 mark,

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[273] The research into this Chapter is supported by the Korea Foundation under the research theme 'Korean Climate Change policy – economic, legal and political perspectives of linking.'

[274] Price volatility generally refers to a change in prices over time. Price changes are expected in markets, and carbon markets are no exception. In so far as the change in prices reflects market fundamentals, hence predictable, it may not be problematic. It becomes problematic when it is large and cannot be anticipated, creating uncertainties for market participants and leading to suboptimal decisions. By price volatility, we mean the latter.

[275] DA Ellerman and BK Buchner, 'Over-Allocation or Abatement? A Preliminary Analysis of the EU ETS based on the 2005-06 Emissions Data' (2008) 41 Environmental Resource Economics 267.

[276] M Ferdinand, 'The EU ETS – Struggling for Shortage: What Policies Required to Get a Functioning Carbon Market up and Running?' (ICAP Advanced Course on Emissions Trading, London, July 2015).

contributing to the EU ETS's surplus of over 2 billion allowances.[277]

The price volatility in the EU ETS is not by any means unique. In the summer of 2000, the Regional Clean Air Incentives Market programme in California saw a sudden spike in the price of NOx emissions allowances from an average of $400/t to an average of over $40,000 due to an energy crisis.[278] When the EU and Australia announced in August 2012 an agreement to link their respective carbon markets as of 2015,[279] the expected price of Australian Carbon Units (ACUs) – the carbon currency of the (now defunct) Australian CPM – for 2015 dropped from A$29/$tCO_2$ to A$12.1/$tCO_2$.[280]

With volatile prices, economic actors defer long-term low-carbon investments. This may lock-in carbon-intensive investments, undermining the dynamic efficiency of carbon markets and increasing the costs of transitioning an economy into a low-carbon future.[281] Several jurisdictions have attempted to enhance the dynamic efficiency of their respective ETSs by introducing market stabilisation measures. As these measures vary from one jurisdiction to another, the relevant question is whether and how different market stabilisation measures affect linking ETSs. This chapter addresses this question in the context of a bilateral linking scenario between the EU ETS and the Korean ETS. The market stabilisation measures of the EU ETS and the Korean ETS provide an interesting case study not least because they represent different spectra of the debate on whether market stabilisation measures

277 Commission, 'Impact assessment accompanying the document concerning the establishment and operation of a Market Stability Reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC' COM (2014) 20 final.

278 LH Goulder and AD Schein, 'Carbon Taxes versus Cap and Trade: A Critical Review' (2013) 4 Climate Change Economics 1350010, 1350010-12.

279 Commission, 'Australia and European Commission agree on pathway towards fully linking Emissions Trading Systems' *European Commission* (Brussels, 28 August 2012) <http://europa.eu/rapid/press-release_IP-12-916_en.htm?locale=en> accessed 8 November 2016.

280 Point Carbon, 'Australia Takes A$6 Billion Write-down after EU CO_2 Price Fall' *Thompson Reuters* (Oslo, 24 May 2013) accessed 11 February 2014.

281 C Hepburn, 'Regulation by Prices, Quantities or Both: A Review of Instrument Choice' (2006) 22 Oxford Review of Economic Policy 226, 233. See also A Dixit, 'Investment and Hysteresis' (1992) 6 The Journal of Economic Perspectives 107; F Jotzo, T Jordan and N Fabian, 'Policy Uncertainty about Australia's Carbon Price: Expert Survey Results and Implications for Investment' (2012) 45 The Australian Economic Review 395, 404; SE Weishaar, 'Incentivising Technologic Change in Emissions Trading Systems: The Case of Excess Supply' in L Kreiser and others (eds), *Environmental Taxation and Green Fiscal Impact: Theory and Impact* (Edward Elgar 2014).

should regulate prices or quantity. Whereas the EU ETS adopted a quantity scheme of scarcity management called the Market Stability Reserve (MSR), the Korean ETS implemented a plethora of measures, dominated by price-based instruments.

The chapter is organised as follows. Section 4.2 discusses the need for and the mechanisms of stabilising carbon markets. Section 4.3 explains the market stabilisation measures of the EU ETS and the Korean ETS. Section 4.4 analyses the efficiency, environmental integrity, and regulatory implications of the market stabilisation measures for an EU-Korean carbon market. Section 4.5 concludes the Chapter.

4.2. The why and how of stabilising carbon markets

Economic theory predicts that a cap-and-trade scheme allows achievement of a given emissions target at the lowest possible cost. The 'cap', coupled with a credible compliance and enforcement system, ensures that emissions are kept below a specified level. The 'trade' shifts abatement to entities with the lowest marginal abatement cost (MAC). This equalises regulated entities' MACs, leading to the realisation of an environmental target at the least possible abatement cost.[282] However, the success of a cap-and-trade system depends on, in addition to achieving a given emissions target at the lowest possible abatement cost, the extent to which it provides dynamic incentives for the invention, innovation and diffusion of low-carbon technologies.[283]

Cap-and-trade systems trail behind pollution taxes in providing dynamic incentives.[284] This is primarily because a (pure) cap-and-trade system leaves carbon prices uncertain while a pollution tax provides price certainty. In cap-and-trade systems, as in any market, the forces of supply and demand determine the price of

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[282] T Tietenberg, 'The Tradable Permits Approach to Protecting the Commons' in E Ostrom and others (eds) *The Drama of the Commons* (National Academies Press 2002) 204; R Perman and others, *Natural Resource and Environmental Economics* (3rd edn, Pearson 2003) 224-227.

[283] WA Magat, 'The Effects of Environmental Regulation on Innovation' (1979) 43 Law and Contemporary Problems 4. See also AB Jaffe and RN Stavins, 'Dynamic Incentives of Environmental Regulations: The Effects of Alternative Policy Instruments on Technology Diffusion' (1995) 29 Journal of Environmental Economics and Management 43.

[284] AB Jaffe, RG Newell and RN Stavins, 'Environmental Policy and Technological Change' (2002) 22 Environmental and Resource Economics 41; T Requate, 'Dynamic Incentives by Environmental Policy Instruments – A Survey' (2005) 54 Ecological Economics 175; C Allan, AB Jaffe and I Sin, Diffusion of Green Technology: A Survey' (2014) Motu Working Paper 14-04 <http://motu-www.motu.org.nz/wpapers/14_04.pdf> accessed 12 November 2014.

allowances – the commodity traded in carbon markets. In contrast to most markets, however, the supply of emissions allowances is exogenously fixed and relatively inelastic. The cap, which is fixed *ex ante*, puts an absolute limit on the supply of emissions allowances in a given compliance period. The demand for emissions allowances, by contrast, is dynamic and changes in response to demand drivers such as changes in weather conditions, economic growth or slowdown, the successful diffusion of new abatement technologies, or regulatory changes.

With an inelastic supply that neither expands nor contracts in response to, respectively, an increase or a decrease in the demand for allowances, allowance prices respond strongly to demand-side shocks, resulting in higher or lower prices than the predicted carbon price that incentivises an optimal rate of abatement, innovation and investment to reduce costs in the long-run path.[285] Without predictable and politically credible carbon prices, private entities defer long-term low-carbon investments until after a predictable price pattern emerges or 'demand a "risk premium" to overcome the (…) credibility deficit.'[286]

Different policy instruments can be used to address price uncertainty and price volatility in cap-and-trade schemes. Banking, borrowing, and offset provisions and allowance reserve schemes could instil a form of flexibility to an inflexible cap.[287] While banking provisions allow regulated entities to carry over unused allowances to future compliance/commitment periods, borrowing provisions enable covered entities to draw allowances from future compliance/commitment periods for current compliance.[288] Banking and borrowing provisions thus expand a carbon market

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285 B Knopf and others, 'The European Emissions Trading System (EU ETS): Ex Post Analysis, the Market Stability Reserve and Options for a Comprehensive Reform' (2014) 8, FEEM Working Paper No 79.2014 <http://ssrn.com/abstract=2499457> accessed 8 December 2015.

286 Weishaar, 'Incentivising Technologic Change' (n 281) 132. S Fankhauser and C Hepburn, 'Designing Carbon Markets. Part I: Carbon Markets in Time' (2010) 38 Energy Policy 4363; Hepburn, 'Regulation by Prices, Quantities or Both' (n 281) 233-234.

287 B Murray, RG Newell and WA Pizer, 'Balancing Cost and Emissions Certainty: An Allowance Reserve for Cap-and-Trade' (2009) 3 Review of Environmental Economics and Policy84; JB Bushnell, 'The Economics of Carbon Offsets' (2010) 2, NBER Working Paper No 16305 <http://www.nber.org/papers/w16305> accessed 9 December 2015; Fankhauser and Hepburn, 'Carbon Markets in Time' (n 286); S Fankhauser and C Hepburn, 'Designing Carbon Markets. Part II: Carbon Markets in Space' (2010) 38 Energy Policy 4381.

288 Fankhauser and Hepburn, 'Carbon Markets in Time' (n 286); H Fell, E Moore and RD Morgenstern, 'Cost Containment under Cap and Trade: A Review of the Literature' (2011) 5 International Review of Environmental and Resource Economics 285. See also SE Weishaar, *Emissions Trading Design: A*

across time and create temporal flexibility.[289] An allowance reserve introduces some form of flexibility to an ETS's cap by increasing or decreasing allowance supply dynamically in response to changes in demand and/or prices.

Another approach is to design an ETS as a hybrid scheme by incorporating price price-control systems such as a price floor and/or a price ceiling.[290] A price floor guarantees that the carbon price will not fall below a specified amount.[291] A price ceiling is the mirror image of a price floor, and it sets a maximum carbon price. A government could establish a price ceiling by, for instance, committing to sell an unlimited number of allowances if carbon prices reach the level of the ceiling.[292] A price corridor combines a price floor and a price ceiling and allows the carbon price to float between the corridors freely. The narrower/wider the price collar, the more/less certain prices become, the less/more flexible the carbon market gets, and the closer/further the ETS gets to a price instrument in a continuum between pure price and pure quantity instruments.

A third approach to stabilising carbon markets is a dynamic management of supply by an independent authority.[293] An independent regulatory agency decides – in much the same way as an independent central bank would manage monetary policy – the supply of allowances dynamically taking into account the supply-

Critical Overview (Edward Elgar 2014) 61-63.

289 Fankhauser and Hepburn, 'Carbon Markets in Time' (n 286) 4364-4365.

290 WJ McKibbin and PJ Wilcoxen, 'A Better Way to Slow Global Climate Change' (1997) Brookings Policy Brief No 17 <http://www.brookings.edu/research/papers/1997/06/energy-mckibbin> accessed 8 December 2015; WJ McKibbin and PJ Wilcoxen, 'Climate Change Policy after Kyoto: A Blueprint for a Realistic Approach' (2002) The Brookings Institution <http://www.brookings.edu/research/articles/2002/03/spring-energy-mckibbin> accessed 8 December 2015; WJ McKibbin and PJ Wilcoxen, 'The Role of Economics in Climate Change Policy' (2002) 16 Journal of Economic Perspectives 107; Hepburn, 'Regulation by Prices, Quantities or Both' (n 281) 230. C Kettner, D Kletzan-Slamanig and A Koppl, 'The EU Emission Trading Scheme: Is There a Need for Price Stabilisation' in L Kreiser and others (eds), *Environmental Taxation and Green Fiscal Impact: Theory and Impact* (Edward Elgar 2014) 119-122.

291 PJ Wood and F Jotzo, 'Price Floors for Emissions Trading' (2011) 39 Energy Policy 1746.

292 An alternative could be to establish an allowance reserve with a specified number of allowances that will be released if market prices reach the level of the ceiling. See Murray, Newell and Pizer (n 287); H Fell and others, 'Soft and Hard Price Collars in a Cap-and-Trade System: A Comparative Analysis' (2012) 64 Journal of Environmental Economics and Management 183.

293 See G Grosjean and others, 'After Monetary Policy, Climate Policy: Is Delegation the Key to EU ETS Reform?' (2016) 16 Climate Policy 1; C de Perthuis and R Trotignon, 'Governance of CO_2 Markets: Lessons from the EU ETS' (2014) 75 Energy Policy 100.

demand dynamics in the carbon market[294] This option addresses price uncertainty and volatility stemming from political uncertainty and time-inconsistency and an inelastic supply.

A few of these mechanisms, or variations thereof, have already gotten their way into most of current and past ETSs. An unlimited banking, a limited borrowing, and a limited use of offsets are common features of current and past cap-and-trade schemes.[295] The Australian Carbon Pricing Mechanism, abolished in July 2014, was initially designed with price collars.[296] The Regional Greenhouse Gas Initiative enforces price floors through auction reserve prices.[297] The Californian cap-and-trade scheme has an allowance reserve scheme that would be deployed to contain high carbon prices.[298] The EU ETS' MSR is also a form of quantity-based instrument of scarcity management. The Korean ETS incorporates several measures including price floors, price ceilings and an allowance reserve scheme.[299] The next Section elaborates on the market stabilisation measures of the EU ETS and the Korean ETS.

4.3. Market stabilisation measures: EU ETS and Korean ETS

4.3.1. The EU ETS's Market Stability Reserve

The EU ETS faced volatile prices at several junctures.[300] It commenced in 2005 with a modest carbon price of below €10/tCO_2 which continued until mid-2005. Allowance prices peaked to above €30/tCO_2 in April 2006 to later fall sharply after the publication of the first verified emissions which showed the market was over-allocated.[301] Prohibition of banking of Phase I (2005-2007) allowances drove prices

294 Grosjean and others (n 293); de Perthuis and Trotignon (n 293)

295 Weishaar, *Emissions Trading Design* (n 288) 66-96.

296 FG Tiche, SE Weishaar and O Couwenberg, 'Sustaining Climate Policy Reforms: A Tale of Two Reforms' (2014) <http://ssrn.com/abstract=2509505> accessed on 29 August 2016.

297 Weishaar, *Emissions Trading Design* (n 288) 76.

298 Weishaar, *Emissions Trading Design* (n 288) 79.

299 H Park and WK Hong, 'Korea's Emission Trading Scheme and Policy Design Issues to Achieve Market-Efficiency and Abatement Targets' (2014) Energy Policy DOI: 10.1016/j.enpol.2014.05.001.

300 See generally Ellerman and Buchner (n 275); D Ellerman, C Marcantonini and A Zaklan, 'The EU ETS: Eight Years and Counting' (2014) EUI Working Paper RSCAS 2014/04 <http://cadmus.eui.eu/bitstream/handle/1814/29517/RSCAS_2014_04.pdf> accessed 8 December 2015; Ferdinand (n 276).

301 Ellerman, Marcantonini and Zaklan (n 300) 11.

to near zero in September 2007.[302] At the beginning of Phase II (2008-2012), prices picked up and reached near €30/tCO_2 to yet again start declining in late 2008.[303] The price decline has since continued and the beginning of the third trading phase in 2013 saw one of the lowest carbon prices since 2007 with prices reaching below €5/tCO_2. Allowance prices have since not broken the €10/tCO_2 mark, contributing to the EU ETS's 2 billion allowances surplus.[304]

Three major factors are widely believed to have caused the allowance oversupply. The first concerns the economic crisis since 2009 which led to a decline in industrial output and emissions.[305] The second relates to a combination of increased inflow of offset credits during phase II, the early auctioning of Phase III allowances in the final years of the second Phase, and the release of allowances in the New Entrants Reserve.[306] The third factor is an effect of an interaction between the EU ETS and other climate policies, notably renewable and energy efficiency policies.[307]

Since 2010/11 the Commission has been consulting on several short- and long-run policy options to address the problem of oversupply and increase the resilience of the EU ETS to demand-side shocks. For the short-run, the Commission is deferring the auctioning of 900 million allowances (known as 'back-loading') withheld from

302 Ellerman and Buchner (n 275).

303 Ferdinand (n 276).

304 COM (2014) 20 final; C Hepburn and others, 'Introduction: The Economics of the EU ETS Market Stability Reserve' (2016) 80 Journal of Environmental Economics and Management 1.

305 Commission, 'The state of the European carbon market in 2012' COM (2012) 652 final; de Perthuis and Trotignon (n 293) 102-103; Weishaar, 'Incentivising Technologic Change' (n 281).

306 Weishaar, 'Incentivising Technologic Change' (n 281).

307 COM (2012) 652; de Perthuis and Trotignon (n 293) 102-103. For a differing view, see N Koch and others, 'Causes of the EU ETS Price Drop: Recession, CDM, Renewable Policies or a Bit of Everything? – New Evidence' (2014) 73 Energy Policy 676. The effect of renewable energy and energy efficiency policies on the allowance surplus in the EU ETS is known in the literature as the 'waterbed effect'. Renewable energy policies increase the supply of energy from renewable sources, displacing energy from fossil fuel-fired power plants and freeing up emissions allowances that would otherwise be used. When the allowances freed up by the displacement are brought to the market, allowance prices decrease, and covered entities in other sectors are incentivised to increase their emissions. As a result, additional policies, rather than delivering additional emissions reduction, simply redistribute emissions reduction among covered sectors. See Weishaar, *Emissions Trading Design* (n 288) 67-68. See also E Begemann, L Lam and M Neelis, 'The Waterbed Effect and the EU ETS: An Explanation of a Possible Phasing out of Dutch Coal Fired Power Plants as an Example, (2016) Ecofys CSPNL16521 <http://www.ecofys.com/en/publications/the-waterbed-effect-and-the-eu-ets> accessed 22 October 2016.

2014 to 2016 auction volumes to the end of the third phase.[308] This is aimed at temporarily relieving the carbon market from the oversupply and help prices pick-up. Although the back-loaded allowances were initially expected to return to the market by the end of the current trading phase,[309] it is now proposed that they would instead return to the MSR.[310]

The MSR, scheduled to commence in 2019, is expected to address the problem supply-demand imbalance in the long-run.[311] It manages allowance surplus in the market by adjusting annual auction volumes when the overall allowance surplus is outside a predefined range.[312] If the surplus exceeds 833 million, it absorbs 12 per cent of the surplus by withholding them from future auction volumes.[313] If the allowance surplus falls below 400 million, the MSR releases 100 million allowances from the reserve and adds them to future auction volumes.[314] If the reserve has less

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[308] Commission Regulation (EU) No 176/2014 of 25 February 2014 amending Regulation (EU) No 1031/2010 in particular to determine the volumes of greenhouse gas emission allowances to be auctioned in 2013-20 [2014] L 56/11 (hereafter: Back-loading Regulation).

[309] Back-loading Regulation, art 1.

[310] Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC [2015] OJ L 264/1, art 1(2) (hereafter: The Market Stability Reserve Decision).

[311] In addition to implementing the MSR, the Commission has also proposed as part of the EU ETS's phase IV (2021-2030) revision agenda to increase the linear reduction factor – the rate at which the EU ETS's cap tightens annually – from 1.7 per cent (the rate since 2013) to 2.2 per cent. See Commission, 'A policy framework for climate and energy in the period from 2020 to 2030' (Communication) COM (2014) 15 final.

[312] The allowance surplus is defined as the difference between the total number of allowances issued and international credits submitted from 1 January 2008 to the end of a given year, and verified emissions recorded since 2008 and the number of allowances in the MSR in the relevant year. See The Market Stability Reserve decision, art 1(4). See also COM (2014) 20 final, 3.

[313] The Market Stability Reserve Decision, art 1(5). The European Parliament passed a vote on 15 February 2017 outlining its position on the EU ETS's post-2020 reform. It agreed, *inter alia*, to permanently cancel 800 million allowances held in the MSR in 2021 and to double the rate at which the MSR absorbs surplus allowances from the market from 12 per cent to 24 per cent during the period 2019-2022. At the time of writing (20 February 2017), the Council has yet to finalise its joint position on the the post-2020 EU ETS reform before trilogue negotiations between the Commission, the Parliament and the Council could start. See International Carbon Action Partnership (ICAP), 'European Parliament Passes Proposal for Reforming the EU ETS' *ICAP* (Berlin, 17 February 2017) <https://icapcarbonaction.com/en/news-archive/443-the-european-parliament-passes-proposal-for-reforming-the-eu-ets> accessed 20 February 2017.

[314] The Market Stability Reserve Decision, art 1(6).

than 100 million allowances, all allowances in reserve will be released. Whenever the allowance surplus remains between the 400 million and 833 million thresholds, the MSR plays no role.[315]

The Commission argued that the MSR provides a rule-based, non-discretionary and predictable mechanism of addressing supply-demand imbalances in the long-run.[316] It also indicated that several stakeholders supported the idea of a quantity mechanism of supply management. Alternative proposals, especially direct price-management schemes, could not garner as much support because they are against the 'central principles' of the EU ETS 'as an instrument based on volume not on price'.[317] The Commission further noted that 'agreeing on the "right" price thresholds would be very contentious, if not impossible'.[318]

4.3.2. The Korean ETS's approach to market stabilisation

The Korean ETS, which commenced on 1 January 2015, is a cap-and-trade scheme covering 66 per cent of South Korea's annual emissions.[319] It is structured into several phases, each running for five years, except that the first two phases run for three years each.[320] Each period operates under a separate set of rules outlined in an allocation plan.[321] The allocation plans specify, *inter alia,* the cap for a given phase, the total number of allowances for each compliance year, the types of sectors and businesses to be covered by the ETS, and the distribution criteria of emissions allowances.[322]

The Korean ETS incorporates several instruments that authorities may deploy to address market instability. Regulatory measures may be taken if either of the following conditions is met: (i) the average allowance price in the preceding six

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315 There is an exception to this. The MSR will release 100 million allowances annually if a measure is adopted according to Article 29a of Directive 2003/87/EC, which specifies the conditions under which measures to control sudden allowance price spikes could be taken. See The Market Stability Reserve decision, art 1(7).

316 COM (2014) 20 final, 17.

317 COM (2014) 20 final, 14.

318 COM (2014) 20 final, 14.

319 International Carbon Action Partnership (ICAP), 'Emissions Trading Worldwide: International Carbon Action Partnership Status Report 2016' (ICAP 2016) 57.

320 Act on the Allocation and Trading of Greenhouse Gas Emission Permits [Act No 11690, 23 March 2013], art 2(4) (hereafter: Allocation and Trading Act). See also Park and Hong (n 299) 3.

321 Allocation and Trading Act, art 5.

322 Allocation and Trading Act, art 5.

consecutive months increases by more than threefold of the average allowance price in the past two years; (ii) the average allowance price in the preceding six consecutive months is more than twofold the average allowance price in the previous two years and the average trading volume of one month is at least twice the volume of the same month in the past two years; or (iii) the average price of allowances in the preceding month falls below 60 per cent of the average price for the two preceding years.[323]

The fulfilment of either of the aforementioned conditions is not, however, a sufficient condition to introduce market stabilisation measures. The enabling statute of the Korean ETS and its accompanying enforcement decree state that the Minister of Environment, in consultation with the Emission Permits Allocation Committee (EPAC),[324] '*may* take measures for stabilising markets' if any of the aforementioned conditions are met.[325] If the Minister of Environment decides to take market stabilisation measures, it can choose to: (i) release additional allowances not exceeding 25 per cent of the total allowance reserve; (ii) set a temporary price floor or price ceiling; (iii) increase or decrease the quota on the use of offset credits;[326] (iv) increase or decrease allowance borrowing between compliance years;[327] (v) require compliance entities to hold a maximum or a minimum number of allowances.[328]

In stark contrast to the EU ETS' MSR, the Korean ETS' market stabilisation measures are neither rule-based nor non-discretionary. Whereas predefined quantity-based triggers set the MSR in motion, the ultimate decision whether to take market stabilisation measures in the Korean ETS rests with the Minister of Environment

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323 Allocation and Trading Act, art 23; Enforcement Decree of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits [Presidential Decree No 24429, 23 March 2013], art 30 (hereafter: Enforcement Decree of the Allocation and Trading Act).

324 The EPAC, chaired by the Minister of Finance and Strategy, is constituted of not more than 20 persons. Its members include 'public officials at the level of Vice Minister' from several Ministries and private individuals appointed by Minister of Finance and Strategy. The EPAC plays several critical roles in the governance of the Korean ETS including allowance allocation, market stabilisation, and linking the Korean ETS to other markets. See Allocation and Trading Act, arts 6 and 7.

325 Allocation and Trading Act, art 23.

326 Currently, covered entities may cover up to 10 per cent of their emissions in a compliance year using domestic offset credits. Allocation and Trading Act, art 29(3); Enforcement Decree of the Allocation and Trading Act, art 38(4); ICAP (n 319) 57.

327 Covered entities are allowed, under some conditions, to borrow allowances from future compliance periods to cover up to 10 per cent of their obligation in a given compliance period. Allocation and Trading Act, art 28; Enforcement Decree of the Allocation and Trading Act, art 36.

328 Allocation and Trading Act, art 23; Enforcement Decree of the Allocation and Trading Act, art 30.

and the EPAC.[329] Also, whereas the MSR ceases to absorb or release allowances based on quantity-based triggers that are set in advance, market stabilisation measures will not be withdrawn from the Korean ETS unless the EPAC decides that the objectives of introducing the measures are achieved.[330] It also remains unclear how the different measures will be implemented. Will the price floor, for instance, be implemented through a government buyback scheme, a fee payable by covered entities, or something else? As will be discussed in the next Section, the answers to these questions have efficiency, environmental integrity and regulatory implications for the ETS and its prospects for linking.

4.4. Market stabilisation measures and linking

The previous Section showed that the EU and Korean ETSs apply different types of market stabilisation measures. The differences can be summarised into three. First, while the EU ETS uses a system of scarcity management, the Korean ETS predominantly uses direct price control mechanisms. Second, the Korean ETS' market stabilisation measures are less immune from political influence than those of the EU ETS'. While the EU ETS' MSR is rule-based, non-discretionary, and automatic, the market stabilisation measures of the Korean ETS are deployed only after a decision to that effect is taken by a political body – the EPAC. Third, the EU ETS sets quantity-based triggers for the MSR while, on the other hand, the Korean market stabilisation measures use price-based triggers.

This Section examines the efficiency, environmental integrity, and regulatory implications of allowing a mix of the EU and Korean market stabilisation measures operate side-by-side in a linked EU-Korean carbon market.

4.4.1. Efficiency implications

Unlike the triggers of the EU ETS's MSR, the price-based triggers of the Korean ETS are not fixed. The trigger prices will move following the average price of allowances over the preceding two years. The triggers do not thus afford as much price certainty as fixed price triggers. Two additional factors compound the uncertainty. First, the deployment of the market stabilisation measures in Korea is not automatic. Measures

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329 Allocation and Trading Act, arts 8(1) and 23(1); Enforcement Decree of the Allocation and Trading Act, arts 6(1) and 30.

330 Enforcement Decree of the Allocation and Trading Act, art 30(7&8).

can be deployed only after the EPAC takes a decision to that effect. Second, it remains unclear which and how many of the several instruments will be deployed if the price-based triggers are met.

The absence of fixed price triggers, the lack of clarity about the type and number of instruments that will be deployed to address too low or too high prices, and the room for political manoeuvre through the EPAC sow uncertainty. Because linking creates interdependence between the climate policies of the linking jurisdictions and a regulatory intervention in one jurisdiction affects the other, the uncertainty pervading the Korean carbon market would also impact the EU ETS by obstructing price discovery.

The differences in the nature of the respective schemes' triggers may also invite incoherent regulatory interventions. The MSR is designed to absorb or release allowances based on a relative surplus in the market irrespective of the level of the carbon price. If the MSR absorbs allowances, prices will increase. The price increase may, in turn, activate the Korean price ceiling or other similar measures, increasing allowance supply in the market that may in turn again activate the quantity-based triggers of the MSR to absorb allowances. The mix of the EU and Korean market stabilisation measures may thus set off a cycle of regulatory intervention that sows uncertainty, distorts price discovery, and erodes credibility in the market. Ironically, the measures designed to bring stability and predictability to the market might create instability and erode confidence in the carbon market.

In addition, the mechanisms through which the market stabilisation measures of the Korean ETS will be implemented will have different efficiency implications. This could be illustrated by showing how alternative ways of implementing a price floor affect economic efficiency. Wood and Jotzo outline three alternative ways of implementing a price floor: an auction reserve price, a government buyback scheme, or a (fixed or flexible) fee or tax that covered entities pay in addition to surrendering allowances to cover their emissions in a compliance year/period.[331] An auction reserve

[331] Wood and Jotzo (n 291) 1748-1750. Taxes are legally and conceptually distinct from fees. A critical distinction between taxes and fees concerns the benefits that payers receive. Because taxes are characterised as 'compulsory and unrequited', benefits that taxpayers receive from government are not usually in proportion to their payment. On the other hand, fees are paid 'for services rendered and … [should be] in proportion to the costs incurred.' See SE Weishaar, 'Fault Lines between Fees and Taxes: Legal Obstacles for Linking' in L Kreiser and others (eds), *Carbon Pricing: Design, Experience and Issues* (Edward Elgar 2015) 37. See also JE Milne, 'Environmental Taxes and Fees: Wrestling with

price sets a minimum price for allowances auctioned, and no allowances are sold below the reserve price.[332] Whether an auction reserve price establishes an effective floor price depends on the share of auctioned allowances relative to those distributed free of charge. The larger/smaller the share of auctioned allowances, the higher/lower the likelihood that an auction reserve price guarantees a minimum price.

In a buyback scheme, the government guarantees to buy an unlimited number of allowances if prices fall below a specified threshold.[333] While easy to implement and effective, a buyback scheme could be financially burdensome. Finally, a fixed fee functions as an additional carbon tax on the emissions that regulated entities must cover by surrendering allowances.[334] Alternatively, a flexible fee can be levied by setting a threshold (floor) price and requiring covered entities to pay the fee only if allowance prices fall below the threshold price. When allowance prices fall below the threshold, covered entities pay a fee equivalent to the difference between the threshold price and the allowance price.[335]

In the context of the Korean ETS, an auction reserve price cannot guarantee a minimum allowance price because the share of (to be) auctioned allowances in the Korean ETS is too small to guarantee a minimum allowance price.[336] A government buyback scheme would be effective but financially burdensome not least because the government generates (almost) no revenue from selling allowances. The third option – imposing a fixed fee per tonne of CO_2 in addition to requiring covered entities to surrender an allowance covering the relevant emission – will increase the cost of abatement in an EU-Korean carbon market. To show this, I will discuss the effect of the fee on allowance prices in the Korean ETS both in autarky and after linking one after the other.

Theory' in L Kreiser and others (eds), *Environmental Taxation and Green Fiscal Reform: Theory and Impact* (Edward Elgar 2014). This conceptual distinction, Weishaar argues, has legal implications. Since our analysis is not concerned with the legal characterisation of taxes and fees, the concepts are used here interchangeably.

332 Wood and Jotzo (n 291) 1749.

333 Wood and Jotzo (n 291) 1748.

334 Wood and Jotzo (n 291) 1749.

335 Wood and Jotzo (n 291) 1749-1750.

336 The share of auctioned allowances in the first, second and third trading phases is, respectively, zero, three and 'more than 10' per cent. Korea Environment Institute, 'Emissions Trading Scheme' (2015) 7, Korea Environmental Policy Bulletin Vol XIII Issue 1 <http://eng.me.go.kr/eng/file/readDownloadFile.do?fileId=133612&fileSeq=1> accessed 23 December 2016. See also ICAP (n 319) 57.

A profit maximising firm covered by an ETS must decide whether to continue emitting GHGs (and procure allowances to cover those emissions) or to reduce its emissions by adopting, say, low-carbon production methods and processes. A firm decides whether to abate or to buy allowances based on its MAC function and the price of emissions allowances. Given the firm's abatement cost function, an increase/a decrease in the price of allowances makes one abatement option more/less attractive than the other. If prices increase, the firm's opportunity cost of switching to (previously unattractive) low-carbon abatement options will decrease. On the other hand, if allowance prices decrease, previously affordable abatement options on the firm's cost of abatement schedule will become off limits.

Suppose the carbon price is below the level the government thinks it should be. It decides to levy a fee. Let's examine the effects of the fee on the overall level of abatement and the price of allowances. In a cap-and-trade system, the overall level of abatement is determined by the cap. The carbon price does not affect the overall level of abatement; it only directs the distribution of abatement efforts among regulated entities. As a result, with or without the fee, the level of the overall abatement in a cap-and-trade system remains at the level of the cap. However, the fee will affect allowance prices. The imposition of the fee incentivises firms to increase their abatement efforts, leading to a decrease in demand for emissions allowances and a downward shift in the demand curve. With a downward shifting demand curve and a constant supply curve, the equilibrium price decreases and the equilibrium quantity (overall level of emissions abatement) remains unaffected by the fee. Since the levy compensates for the extra fall in allowance prices, the effective carbon price – now comprising the fee and the market-based allowance price – remains unaffected.[337] In sum, the fee will neither lead to a change in the overall level of abatement nor to a higher effective carbon price than a situation without the fee.[338] To be sure, the fee ensures price certainty by keeping the effective carbon price at or above the level of the fee.[339]

In the context of a bilateral link between the EU and Korean ETSs, the fee would be asymmetric as the EU ETS lacks (or does not envisage) a similar system.

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[337] S Fankhauser, C Hepburn and J Park, 'Combining Multiple Policy Instruments: How not to Do It' (2011) 7-9, Grantham Research Institute on Climate Change and the Environment Working Paper No 38 <http://eprints.lse.ac.uk/37573> accessed 9 December 2015.

[338] Fankhauser, Hepburn and Park (n 337) 9.

[339] Wood and Jotzo (n 291) 1749-1750.

The pre-linking symmetry between an increase in the level of the fee and the corresponding decrease in allowance prices will be lost after the Korean ETS links with the EU ETS. In this asymmetric setting, the unilateral fee will be added on top of the international carbon price that the Korean ETS – given its relatively small size compared to the EU ETS – hardly influences. This would increase the effective carbon price (marginal cost of abatement) in the Korean ETS above the international carbon price by the level of the fee or a little less than that.

The increase in the marginal cost of abatement shifts more abatement to the Korean ETS than would happen in a linking scenario without the fee/tax. Since efficiency requires equalisation of firms' MACs across the linking-partner ETSs, the unilateral fee leads to inefficiencies as it prevents equalisation of MACs of Korean and EU entities. This means that abatement will not be shifted to wherever it may be achieved at the least cost, increasing the overall cost of mitigation and reversing, at least in part, the gains from trade.

4.4.2. Environmental integrity

The environmental effectiveness/integrity of a cap-and-trade scheme depends on its cap, a robust system of monitoring, reporting and verification, and a credible compliance and enforcement system.[340] Provided that the cap is set at a socially desirable level and it is backed by a robust and credible monitoring and compliance system, a cap-and-trade scheme is environmentally effective. Linking does not affect this because it simply shifts abatement within the participating cap-and-trade schemes without affecting the aggregate level of emissions.

The conclusion that the post-linking aggregate emissions would be a sum of the individual linking-partner schemes' caps in autarky rests on the assumption that each linking-partner ETS has a cap that is fixed *ex ante* and is immune from adjustment *ex post*. If either of the linking-partner ETSs deviates from these assumptions, aggregate emissions under linking may be higher or lower than in autarky. The Korean ETS, for instance, foresees adjustment of its cap *ex post* through the setting of a temporary price ceiling that addresses allowance price spikes.[341] In theory, the government could, if the price ceiling is triggered, issue an unlimited number of allowances,

[340] Tietenberg, 'The Tradable Permits Approach' (n 282) 200-201; Weishaar, *Emissions Trading Design* (n 288) 40-41.

[341] Allocation and Trading Act, art 23; Enforcement Decree of the Allocation and Trading Act, art 30.

require firms to pay the ceiling price in lieu of surrendering allowances, or set up a limited pool of allowances that will be released to the market when prices reach the ceiling level.[342] Each of these options for implementing the price ceiling will undermine the environmental integrity of an EU-Korean carbon market.

A significant price increase in an EU-Korea carbon market is likely to largely reflect changing market fundamentals in the EU ETS. Any measure that aims to address the price increase should address those market fundamentals. If the government implements the price ceiling through the issuance of an unlimited number of emissions allowances or by requiring firms to pay the ceiling price instead of surrendering allowances, it will have to address a surge in demand for emissions allowances both from the Korean ETS and the EU ETS. Korea's price ceiling will propagate to the EU ETS and aggregate emissions under linking will exceed the level in autarky.

Regarding the option of setting up a limited pool of allowances to be released if the price ceiling is triggered, the Korean ETS already allows releasing additional allowances not exceeding 25 per cent of the total allowance reserve to address high allowance prices.[343] Because releasing additional allowances is provided as an alternative instrument of addressing price volatility to other instruments such as a price ceiling, it seems unlikely that it will be used as a mechanism of implementing the temporary price ceiling. If it is used as such, the government must release, as discussed above, far more number of additional allowances under linking than it would in autarky, undermining environmental integrity.

Finally, the Korean ETS's borrowing provisions will also threaten environmental effectiveness of a linked EU-Korean carbon market.[344] Borrowing provisions, which allow firms to borrow emissions allowances from future compliance periods for current compliance, could address problem of price volatility by instilling temporal flexibility, helping firms to spread abatement over time.[345] However, they may also undermine environmental integrity of an ETS by creating problems of moral hazard

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342 See Murray, Newell and Pizer (n 287); Fell and others (n 288).

343 Allocation and Trading Act, art 23(2).

344 To address a sudden increase in allowance prices, the EPAC may increase the borrowing limit that is currently set at 10 per cent of a firm's compliance obligation in a given compliance period. Allocation and Trading Act, art 28; Enforcement Decree of the Allocation and Trading Act, art 36.

345 See Fankhauser and Hepburn, 'Carbon Markets in Time' (n 286).

and adverse selection.[346] Firms may borrow from future compliance periods and exit the market before achieving the time-shifted emissions (a problem of moral hazard). Financially troubled firms are also likely to borrow more than solvent firms (a problem of adverse selection). In both cases, the environmental integrity of the relevant ETS is undermined. Intuitively, the margin by which the borrowing limit will be increased is likely to be higher under linking than in autarky, propagating the Korean ETS's borrowing provisions to the EU ETS and compounding the environmental integrity concerns associated with these provisions.

4.4.3. Regulatory implications

Linking ETSs establishes trade in emissions rights between firms covered under the linking-partner ETSs. This Section discusses, first, whether price volatility increases or decreases under linking relative to autarky. Second, it discusses the implications of the interdependence created by linking ETSs for the regulatory autonomy of the linking-partner jurisdictions and the effectiveness of unilateral market stabilisation measures.

Compared to a pre-linking scenario, does linking increase/decrease price volatility in the linking-partner ETSs? This is likely to be affected by the relative size of the linking-partner ETSs and whether the source of the price volatility is global or local. In the case of a global price shock affecting relevant linking-partner ETSs equally, linking is likely to help them absorb the price shock by increasing liquidity and flexibility. This is vital especially to small ETSs that inevitably face limited flexibility and liquidity due to their size. In the context of the EU and Korean ETSs, the liquidity benefits of linking would be greater to the Korean ETS – an ETS about a fourth of the size of the EU ETS.

Where the price shock is local, the inter-system trading in allowances increases the risks of contagion of the shock from one ETS to others.[347] The disrupting

346 See H Fell, E Moore and RD Morgenstern, 'Cost Containment under Cap and Trade: A Review of the Literature' (2011) 5 International Review of Environmental and Resource Economics 285; Weishaar, *Emissions Trading Design* (n 288) 61-63.

347 WJ McKibbin, A Morris and PJ Wilcoxen, 'Expecting the Unexpected: Macroeconomic Volatility and Climate Policy' (2008) Brookings Global Economy and Development Working Paper No. 28 <http://ssrn.com/abstract=1324938> accessed 7 December 2015. A fitting example is what ensued after the EU and Australia announced in August 2012 a proposed link between their respective ETSs commencing in July 2015. The expected price of ACUs – Australia's primary carbon 'currency' – for 2015 slumped from near A$30/tCO2 to just A$12.1. See Point Carbon (n 280). Although linking

impacts of such price shocks crucially depend on the relative size of the linking-partner ETSs. In a bilateral link between ETSs with significant variation in size, price shocks originating from the larger ETS may lead to more instability in the smaller ETS than the other way round. This is likely to be the case in a full bilateral linking between the EU and Korean ETSs because the demand-supply dynamics in the EU ETS will largely determine the post-linking carbon price and the Korean ETS will become a price-taker.

Linking also creates interdependence in the linking-partners' climate policies. Each jurisdiction's climate policies will become less immune to regulatory interventions in other jurisdictions. The cross-border impacts of the regulatory interventions depend again on the relative size of the linking-partner ETSs. In a linking between ETSs with significant variation in size, regulatory measures taken in the bigger market largely shape the supply-demand dynamics in the linked carbon market. The smaller market becomes a price-taker and its regulatory measures only marginally influence the overall carbon market.[348]

While the smaller market suffers from localised price shocks originating from the bigger market, its regulatory measures become relatively ineffective in addressing the ensuing market instability. This can be illustrated using the Korean ETS's price floor. Trying to set the price floor through an auction reserve price would be ineffective because almost all allowances are allocated free of charge. Even if the Korean ETS were to auction all its allowances, an auction reserve price would not guarantee a price floor without a similar scheme in the EU ETS. By contrast, a government scheme that buys back allowances at a threshold price could guarantee a price floor. However, this requires buying allowances also flowing from the EU ETS. Because of linking, the financial burden of buying back allowances balloons.

As Flachsland and his colleagues pointed out, localised price shocks will be unavoidable in so far as the economies of the linking-partners remain idiosyncratic, making each linking-partner jurisdiction better placed to respond to such shocks

ETS is expected to cause permit prices to increase in one scheme and to decrease in another, the price slump in the Australian CPM reflected the contagion of the EU ETS's regulatory uncertainty concerning allowance oversupply. The linking brought policy uncertainties of EU ETS to the shores of the Australian carbon market.

[348] It has to be noted that regulatory actions of a small ETS could, in some circumstances, have significant implications for the interconnected carbon market. This is, for instance, the case when a small ETS enforces a price ceiling through an unlimited issuance of allowances.

independently.[349] Yet, linking reduces the effectiveness of unilateral regulatory measures, especially by smaller ETSs. Faced with ineffective unilateral measures, linking-partner jurisdictions could be driven to agreeing on a harmonised set of market stabilisation measures or put in place other governance structures that dynamically address the instability of the interconnected carbon market.[350]

However, neither agreeing on a harmonised set of measures nor ceding regulatory autonomy to, for instance, an independent agency is easy especially if the linking-partner jurisdictions pursue different climate policy priorities. In the context of the EU ETS, for instance, the EU has shown an aversion to price-based market stabilisation instruments.[351] The Commission portrayed price-based instruments as incompatible with the EU ETS for they 'would fundamentally modify the EU ETS, as the system would no longer be a quantity-based [instrument].'[352] It further argued that price-based instruments would leave the decision on prices to policymakers.[353] Instead the EU opted for a rule-based and predictable system scarcity management that foresees no significant role for the Commission or the Member States.[354] The EU seems to (implicitly) favour high and predictable carbon prices that will drive investment and innovation in low carbon technologies.[355]

In contrast, Korea liberally drew from both price and quantity instruments in setting up its market stabilisation measures. The market stabilisation measures are, unlike the EU ETS's MSR, discretionary and foresee an active involvement of the

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349 C Flachsland, R Marschinski and O Edenhofer, 'To Link or not to Link: Benefits and Disadvantages of Linking Cap-and-Trade Systems' (2009) 9 Climate Policy 358, 366.

350 For a discussion of institutional arrangements of linking, see MA Mehling and E Haites, 'Mechanisms for Linking Emissions Trading Schemes' (2009) 9 Climate Policy 169; B Görlach, MA Mehling and E Roberts, 'Designing Institutions, Structures and Mechanisms to Facilitate the Linking of Emissions Trading Schemes' (German Emissions Trading Authority 2015).

351 See, for instance, Weishaar, 'Incentivising Technologic Change' (n 281) 141.

352 COM (2014) 20 final, 21.

353 COM (2014) 20 final, 21.

354 COM (2014) 20 final, 17-21.

355 This need not imply that too high carbon prices are not a concern in the EU ETS. They are. After all, the MSR is designed to address both too high and too low allowance prices. Also, Article 29a of Directive 2003/87/EC stipulates the institutional mechanisms of addressing too high allowance prices. Yet since the first phase, there has been a growing concern that the EU ETS has not been able to deliver a predictable and sufficiently high carbon price to incentivise research and development and long-term investments in low-carbon technologies. The recent discussion about structural reforms was also started largely due to concerns about the dynamic efficiency of the ETS.

government. Korea seems to be concerned about the economic consequences of high allowance prices especially during the early years of the ETS. It is no coincidence that the EPAC is largely composed of senior officials from several Ministries and that it housed within the Ministry of Strategy and Finance. These different policy priorities and preferences are likely to make addressing the regulatory challenges of linking by pooling sovereignty or putting in place other forms of coordination difficult.

4.5. Conclusion

This Chapter analysed if and how different market stabilisation measures affect the linking ETSs by taking the EU and Korean ETSs as examples. The two jurisdictions differ not only in their policy arsenal targeting market instability but also in the policy priorities they would like to achieve through their respective measures. In terms of instrument choice, the EU excludes price-based instruments from it policy arsenal. By contrast, Korea cobbles together both quantity-based and price-based instruments. That the two jurisdictions use different policy instruments will have profound implications for the efficiency and environmental integrity of an EU-Korean carbon market.

From the perspective of safeguarding efficiency and environmental integrity, a linked EU-Korean carbon market is likely to be better served by a harmonised set of market stabilisation measures or other governance structures such as dynamic supply management by a supranational independent agency. Neither is easy given the jurisdictions' seemingly incompatible policy priorities. This may partly be explained by the different stages of development of the respective carbon markets.

At the early stages of the EU ETS, policymakers focused on garnering stakeholders' support for an 'alien' climate policy instrument.[356] Despite the Commission's implicit plea for a centralised scheme with a bigger share of auctioning in the allocation of allowances, the EU ETS commenced as a decentralised scheme, and almost all allowances were allocated for free. These were the 'prices' paid to garner industry support. Over the years, the ETS has undergone several changes, culminating in the current centralised scheme that aspires to phase out free allocation gradually and to deliver high and predictable prices that incentivise investments in low-carbon technologies.

By contrast, as a newcomer to the global landscape of emissions trading, Korea

[356] See the discussion in Section 6.2.2 below in Chapter 6 on the politics of pricing carbon in the EU.

seems to be concerned about carbon prices spiralling out of control. This might explain the diversity of its policy arsenal targeting market instability and the active government involvement in their operation. In time, the respective jurisdictions' climate policy priorities may align to one another. Without this, linking the two systems with their current set of market stabilisation measures raises serious environmental integrity and economic efficiency concerns.

5
Offset Provisions and Linking

5.1. Introduction

Several emissions trading systems (ETSs) recognise offset credits as alternative compliance instruments.[357] When offset credits are accepted in ETSs, they expand the size of the market across space and reduce compliance costs.[358] They also mitigate the short-term costs of transitioning an economy to a low-carbon future while, in the long-run, new technologies are developed, and structural transformations are made, preventing the premature retirement of assets.[359] Offset credits accepted by several ETSs, such Certified Emission Reduction (CER) from the Clean Development Mechanism (CDM), also indirectly link otherwise fragmented carbon markets.[360]

The use of credits in several ETSs is subject to restrictions. The restrictions can be broadly subdivided into three categories: qualitative, geographic, and quantitative.

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[357] International Carbon Action Partnership (ICAP), 'Emissions Trading Worldwide: International Carbon Action Partnership Status Report 2016' (ICAP 2016) 29-67.

[358] S Fankhauser and C Hepburn, 'Designing Carbon Markets. Part II: Carbon Markets in Space' (2010) 38 Energy Policy 4381; R Trotignon, 'Combining Cap-and-Trade with Offsets: Lessons from the EU-ETS' (2011) 12 Climate Policy 273.

[359] EPRI, 'Emissions Offsets: The Key Role of Greenhouse Gas Emissions Offsets in a U.S. Greenhouse Gas Cap-and-Trade Program' (Electric Power Research Institute 2010) 14, <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001019910> accessed 9 December 2015.

[360] RN Stavins and J Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions: Opportunities, Implications, and Challenges' (IETA 2007) Report for International Emissions Trading Association <http://belfercenter.hks.harvard.edu/files/IETA_Linking_Report.pdf> accessed 7 December 2015, 13-14; A Tuerk and others, 'Linking Carbon Markets: Concepts, Case Studies and Pathways' (2009) 9 Climate Policy 341.

Qualitative restrictions define the types of (in)eligible credits or offset projects. An example is a ban on credits from industrial gas projects in the EU ETS,[361] or a ban on credits from the CDM in the Californian and Quebec cap-and-trade schemes.[362] Geographic restrictions spell out the countries or regions from which eligible credits must come. For instance, the EU ETS requires that new CERs (CERs generated from projects registered after 2012) must come from Least Developed Countries (LDCs).[363] Most ETSs in China accept only Chinese CERs.[364] Finally, quantitative restrictions define a quota on the use of credits in a compliance period.

ETSs differ in the types and geographic origins of credits they accept and the quota they impose on the use of eligible credits. It is often argued that differences in offset provisions between to-be-linked ETSs could pose significant barriers to linking.[365] The central thesis of this argument is that if ETSs with different offset provisions are linked, their offset provisions automatically propagate into each other's ETSs, each ETS becoming a 'back-door' through which more restrictive offset provisions of a linking-partner ETSs are ignored. We, however, argue that, seen from an economic perspective, differences in offset provisions need not constitute impediments to linking. We show this by examining the efficiency and environmental integrity effects of differences in offset provisions for a linked carbon market. Yet, political considerations may trump economic considerations, leading to differences in offset provisions constituting impediments to linking.

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361 Commission Regulation (EU) No 550/2011 of 7 June 2011 on determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, certain restrictions applicable to the use of international credits from projects involving industrial gases [2011] OJ L 149/1 (hereafter: Regulation to Ban Credits from Industrial Gas Projects).

362 Cal Code Regs, tit 17, paras 95991-95995 and para 95854; ICAP (n 357).

363 Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the community [2009] OJ L140/63, arts 11a(4) and 11a(5) (hereafter: The Revised Emissions Trading Directive). See also Commission, 'A policy framework for climate and energy in the period from 2020 to 2030' (Communication) COM (2014)15 final, 6; D Meadows, Y Slingenberg and P Zapfel, 'EU ETS: Pricing Carbon to Drive Cost-Effective Reductions Across Europe' in J Delbeke and P Vis (eds), *EU Climate Policy Explained* (Routledge 2015) 53-54.

364 See text to notes 406–409 below.

365 See, for instance, Tuerk and others (n 360) 346-348; J Jakob-Gallmann, *Regulatory Issues in the Carbon Market: The Linkage of the Emissions Trading System of Switzerland with the Emissions Trading Scheme of the European Union* (Schulthess 2011) 140-142; House of Commons Energy and Climate Change Committee, *Linking Emissions Trading Systems* (HC 2014-15, HC 739) 14.

The chapter is structured into four Sections. Section 5.2 discusses the economics of offsets. It discusses the benefits of and concerns about recognising offset credits as alternative instruments of compliance in a domestic ETS. Section 5.3 reviews the offset provisions of several major ETSs. Section 5.4 analyses the implications for linking of differences in the offset provisions of to-be-linked ETSs. Section 5.5 concludes the chapter.

5.2. The economics of offsets

Offset credits represent emissions reductions or removals from sectors and regions not covered by an ETS (known as uncapped sectors and regions).[366] If recognised as instruments of compliance in a given ETS, covered entities can use them to 'offset' (compensate) their emissions. There are several advantages to recognising the use of offset credits as alternative instruments of compliance in an ETS. Their use is also not without costs and controversies. Ideally, an offset policy maximises the net benefits of using offset credits in an ETS. This Section discusses the benefits and costs of using offset credits in an ETS and the trade-offs involved in designing an offset policy.

5.2.1. Benefits of offsets

Combining offsets with an ETS has several advantages. First, offset credits could serve as cost-containment mechanisms.[367] Without offsets, emissions reductions need to be achieved within sectors covered under a carbon trading scheme. This may not only result in higher compliance costs to covered sectors, but it may also undermine political acceptability for an ETS. Offset credits help reduce costs of compliance by increasing flexibility and liquidity in the allowance market. They, therefore, help to control allowance price spikes and reduce compliance costs for covered sectors and the economy at large.

[366] LP Olander and BC Murray, 'Offsets: An Important Piece of Climate Policy Puzzle' (2008) 1, Duke University Nicholas Institute for Environmental Policy Solutions Policy Brief <https://nicholasinstitute.duke.edu/climate/mitigationbeyondcap/offsetseries1> accessed 9 December 2015.

[367] Olander and Murray (n 366) 1; JL Ramseur, 'The Role of Offsets in a Greenhouse Gas Emissions Cap-and-Trade Program: Potential Benefits and Concerns' (2008) 12, CRS Report for Congress Order Code RL34436 <http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL34436.pdf> accessed 9 December 2015; JB Bushnell, 'The Economics of Carbon Offsets' (2010) 2, NBER Working Paper No 16305 <http://www.nber.org/papers/w16305> accessed 9 December 2015.

Second, offsets ease a transition to a carbon-constrained world. By attaching a price tag to every unit of regulated greenhouse gas, emission trading induces decarbonisation through structural transformations in existing production facilities. However, transitioning to a carbon-constrained economy needs time as new low-carbon technologies have to be developed, tested and deployed. Offsets can play a crucial role by serving as near-term, low-cost compliance option while, in the long-term, new technologies are developed, and such structural transformations are made. This allows currently stranded assets to be utilised longer, reducing premature retirement of assets.[368]

Third, offsets engage uncapped sectors and regions in the global climate change mitigation efforts.[369] An offset programme rewards sectors and regions outside the coverage of a carbon trading scheme for reducing their emissions below a fixed baseline. The economic gain from trading in offset credits could incentivise emission reductions or removals and spur innovation in the uncapped sectors and regions that would otherwise remain untapped. For instance, the CDM – the world's largest international project-based offset scheme – not only aims to stimulate sustainable development and emission reductions in developing countries, but it also offers industrialised nations alternative ways of achieving their emission reduction targets.[370]

Fourth, an international offset scheme such as the CDM may serve as a hub for indirect linkages between separate ETSs.[371] Even in the absence of a direct link between individual ETSs, trading between specific schemes and a common offset scheme (such as the CDM) influences how prices develop in the ETSs, reducing the inefficiencies from different allowance prices in the respective schemes in autarky.

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368 EPRI (n 369) 14.

369 Olander and Murray (n 366) 2.

370 See generally MW Wara and DG Victor, 'A Realistic Policy on International Carbon Offsets' (2008) Freeman Spogli Institute for International Studies Working Paper No 74 <https://law.stanford.edu/publications/a-realistic-policy-on-international-carbon-offsets> accessed 9 December 2015.

371 Stavins and Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions' (n 360) 13-14; Tuerk and others (n 360).

5.2.2. Concerns about offsets

Offsets are not without controversies. The major concerns relate to the environmental integrity of offset credits. Additionality constitutes 'the single most contentious issue' about offsets and casts doubt over their environmental integrity.[372] An offset programme is considered as additional if the emission reductions or sequestrations it realises would not have happened but for the economic incentive created by the offset programme. Additionality tests have been used as proxies to test whether or not an offset project is additional.[373] However, quantifying what would happen in the absence of a project (baseline scenario) requires imagining a 'what if' (counterfactual) scenario, hence inherently difficult and imprecise. The concern is that offset credits may end up representing 'phantom' emissions reductions or removals; i.e. emissions reductions that are unreal and that would have happened.[374]

Because setting the 'baseline scenario' is difficult, offset project proponents have incentives to seek credits for emissions reductions/removals that would have happened anyway. An offset programme may thus become a magnet for those sources that would have reduced their emissions notwithstanding the incentive from the offset scheme. In addition, emissions sources might also be reluctant to introduce measures to curb their GHG emissions for this raises the baseline against which eligibility of offset projects might be assessed and takes away the credits they could have earned otherwise. Worse, an offset programme might incentivise

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[372] See MC Trexler, DJ Broekhoff and LH Kosloff, 'A Statistically Driven Approach to Offset-Based GHG Additionality Determinations: What can We Learn?' (2006) 6 Sustainable Development Law and Policy 30, 30-31.

[373] These include regulatory additionality, financial additionality, common practice test, and barrier test. Regulatory additionality tests whether an offset project being undertaken complies with national regulatory requirements or it goes in excess of those requirements. Unless a project reduces emissions below official policies, regulations and standards, it is not deemed additional. Under the financial additionality test, the project proponent needs to establish that had it not been for the financial incentives of the offset scheme, the project would not have been economically viable and a rational economic actor would not have undertaken it. The common practice test requires that an offset project that is considered as additional has to bring more emissions reductions than others which produce the same products and services using common practice technologies. Under the barriers test, a project proponent should prove that there are significant obstacles (such as local resistance to new technologies) to the implementation of the offset project. See Trexler, Broekhoff and Kosloff (n 372) 31.

[374] DM Driesen, 'Linkage and Multilevel Governance' (2009) 19 Duke Journal of Comparative & International Law 389, 399-401.

prospective participants to artificially inflate their emissions so that emission baselines can be set at modest levels. Rather than reducing their carbon footprints, emissions sources would continue emitting far greater volumes as doing so would be profitable.[375]

Additional environmental integrity concerns stem from issues of permanence and leakage. Permanence is most readily associated with carbon sequestration offset projects. Biological carbon sequestration (such as planting trees) absorbs atmospheric carbon and thereby removes CO_2 that is already in the atmosphere. The danger with regard to biological carbon sequestration is that the carbon that is absorbed by the natural ecosystem may be released back into the air due to human-induced (intentional or otherwise) reversals or natural catastrophes such as fire, land use change, and pest attack.[376] Leakage occurs when an offset project in one place/sector induces an increase in emission in other locations/sectors.[377] For instance, a decrease in deforestation in one place as a result of a carbon sequestration offset project may shift demand for timber to another place, increasing logging. The offset programme, rather than reducing emissions, shifts them to other areas/regions.

375 Wara and Victor (n 370) 11-12; Bushnell (n 367) 5.

376 RJ Carpenter, 'Implementation of Biological Sequestration Offsets in a Carbon Reduction Policy: Answers to Key Questions for a Successful Domestic Offset Program' (2010) 31 Energy Law Journal 157, 158. In addressing risks of impermanence, liability could be imposed on buyers or sellers, or absorbed by the system. If financial liability is imposed on buyers, buyers will have the incentive to assess the quality of offset credits ex ante. If liability is imposed on sellers, buyers seek the cheapest offset credits irrespective of their quality. Alternatively, buyers and sellers could be allowed to assign liability through contracts (known as negotiated agreement approach). Although this may lead to efficient allocation of liability, it increases transaction costs. Under a system liability regime, an ETS absorbs risks of reversals and exonerate buyers and sellers from liability. Internalizing risks of reversals requires periodic tightening of the overall cap or otherwise the environmental effectiveness of the scheme may be compromised. Moreover, a system liability approach causes subsidization of poor-performing offset projects by those performing well. See BC Murray and LP Olander, 'Addressing Impermanence Risk and Liability in Agriculture, Land Use Change, and Forest Carbon Projects' (2008) 5-8, Duke University Nicholas Institute for Environmental Policy Solutions Policy <https://nicholasinstitute.duke.edu/climate/policydesign/offsetseries3> accessed 9 December 2015.

377 WA Jenkins, LP Olander and BC Murray, 'Addressing Leakage in a Greenhouse Gas Mitigation Offsets Program for Forestry and Agriculture' (2009) 2, Duke University Nicholas Institute for Environmental Policy Solutions <https://nicholasinstitute.duke.edu/climate/policydesign/offsetseries4> accessed 9 December 2015.

These environmental integrity concerns have given rise to a plethora of restrictions on the use of offset credits as compliance instruments in domestic ETSs.[378] The restrictions come in different forms including qualitative rules specifying the types of (in)eligible credits that could be used for compliance purposes in a relevant ETS; quantitative restrictions that specify a quota on the number of credits that covered entities may surrender over a compliance period; or a ban on the use of offset credits altogether. In setting these restrictions, countries face tradeoffs.

There is a clear trade-off between an environmental objective of ensuring offset credits represent real, additional and permanent emissions reductions and an economic objective of using offset credits as cost-containment measures in a domestic ETS. While strict qualitative restrictions increase the likelihood that the offset credits accepted in the relevant jurisdiction represent real and additional emissions reductions, they eliminate low-cost abatement options that would otherwise bring real emission reductions. On the other hand, lenient qualitative restrictions increase the likelihood that credits representing phantom emissions reductions will be accepted as valid instruments of compliance in a domestic ETS, undermining environmental integrity. They, however, ensure that large volumes of low-cost credits are supplied to the market.

In addition, allowing unlimited use of (cheap) offset credits lowers compliance costs for entities covered under an ETS and the entire economy. This, however, weakens an ETS's carbon price signal and slows down an economy's transition to a carbon-constrained world, or worse, impedes the transition by locking-in inefficient high carbon intensity production assets. If an ETS allows the use of domestic offset credits, the use of (unlimited) international offset credits may face political opposition from sectors participating in the domestic offset scheme.

5.3. Offsets provisions in domestic ETSs

This Section reviews the offset provisions of selected ETSs across the globe and outlines the ETS' qualitative and quantitative restrictions on the use of offset credits in the relevant system.

[378] Driesen (n 374) 402-403.

5.3.1. The EU ETS

The EU ETS bans international credits from nuclear and land use, land-use change and forestry (LULUCF) projects and requires that credits from large hydroelectric projects (more than 20 Megawatt of installed capacity) meet international standards, including those in the 2000 report of the World Commission on Dams.[379] As of 1 May 2013, credits from the destruction of industrial gases (HFC-23 and nitrous oxide (N_2O)) are also banned.[380] The revised ETS Directive (2009/29/EC) requires that CERs generated from projects registered after 2012 must come from projects hosted by LDCs.[381] The EU plans to ban the use of international credits altogether as of 2021.[382]

The credit utilisation limit for Phase III (2013-2020) is coupled to the Phase II (2008-2012) allocations and credit entitlements. Existing operators or installations are entitled to use credits up to either their Phase II credit utilisation limit or 11 per cent of their Phase II free allowance allocations, whichever is higher.[383] New entrants

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379 Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms [2004] OJ L 338/18, art 11(6).

380 Regulation to Ban Credits from Industrial Gas Projects.

381 Because the EU ETS Directive was adopted prior to the 2009 United Nations Climate Change Conference in Copenhagen, the rules for the use of international offset credits are crafted under the expectation that an international agreement on climate change succeeding the Kyoto Protocol might be reached in Copenhagen. Had an international agreement succeeding the Kyoto Protocol been reached in Copenhagen, only CERs and ERUs generated in countries that ratified the international agreement would have been acceptable. Absent an international agreement by 31 December 2009, the Directive allows the use of 'credits from projects or other emission reducing activities (…) in accordance with agreements concluded with third countries.' In the event that no international agreement is adopted and that an agreement between the EU and third countries is reached, article 11a(4-5) prohibits the use of CERs generated beyond 2013 unless they are from LDCs. As no international agreement had been adopted in Copenhagen, nor had the EU concluded agreements with third countries, the default situation provided by article 11a(4-5) applies. The Revised Emissions Trading Directive, arts 11a(4) and 11a(5). See also Commission, 'Questions and answers on use of international credits in the third trading phase of the EU ETS' (14 November 2011) <https://ec.europa.eu/clima/news/articles/news_2011111401_en> accessed 27 May 2017.

382 COM (2014)15 final, 6.

383 Commission Regulation (EU) No 1123/2013 of 8 November 2013 on determining international credit entitlements pursuant to Directive 2003/87/EC of the European Parliament and of the Council [2013] OJ L 299/32, art 1(1) (hereafter: International Credit Entitlements Regulation).

may use international credits to cover up to 4.5 per cent of their verified emissions in 2013-2020.[384]

5.3.2. The New Zealand ETS

The New Zealand ETS was launched in 2008 with the purpose of achieving the country's Kyoto Protocol commitment and reducing greenhouse gas emissions in a cost-effective manner.[385] When launched, the ETS allowed the use of most Kyoto Units - Assigned Amount Units (AAUs), CERs, Emission Reduction Units (ERUs), and Removal Units (RUs) – except that imported AAUs, Temporary CERs (tCERs), Long-term CERs (lCERs) and credits from nuclear projects were excluded.[386] In addition, New Zealand imposed no quantitative restriction on the use of eligible credits, giving covered entities unrestricted access to eligible Kyoto Units and turning the ETS into an uncapped scheme.

A review of the ETS in 2011 by an independent panel of experts recommended banning the use of CERs generated from the destruction of HFC-23.[387] The reasons for the recommendations were twofold. The first concerns environmental integrity concerns.[388] Because HFC-23 is a by-product of HFC-22 and that credits could be earned through the CDM by destroying HFC-23, project developers increased their production of HFC-22 – an Ozone depleting potent greenhouse gas. The perverse incentive created by the CDM harms the environmental integrity of the credits generated from the destruction of HFC-23.

The second reason arises from the EU ETS's ban on the use of credits from industrial gas projects.[389] Because the EU banned credits generated from industrial gas projects (including HFC-23), it was conceivable that, if accepted, these credits would flood the New Zealand market and drive down prices of New Zealand Units (NZUs) – the domestic carbon 'currency'. Following a subsequent public

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384 International Credit Entitlements Regulation, art 1(2).

385 Climate Change Response Act 2002 (NZ) s 3(1).

386 Climate Change Response Act 2002, s 4 and s 18CB; New Zealand Emission Unit Register, 'Guide to Surrender of Units' (2013) <http://www.eur.govt.nz/how-to/guides-hmtl/guides-pdf/Guide%20to%20Surrender%20of%20Units_%20Jan%202013.pdf> accessed 10 December 2015.

387 Emissions Trading Scheme Review Panel, 'Doing New Zealand's Fair Share. Emissions Trading Scheme Review 2011: Final Report' (Ministry for the Environment 2011) 77.

388 Emissions Trading Scheme Review Panel (n 387) 77.

389 Emissions Trading Scheme Review Panel (n 387) 77.

consultation,[390] the government banned, effective from 18 December 2012, the use of CERs generated not only from HFCs but also from N_2O.[391] The ban was later expanded to cover ERUs generated from these two industrial gases and CERS and ERUs generated from large hydroelectricity dams.[392]

In 2012 New Zealand formally withdrew from the second commitment period of the Kyoto Protocol, which runs from 2013 to 2020. This entails, according to a decision taken at the 18th session of the Conference of the Parties (COP 18) to the United Nations Framework Convention on Climate Change (UNFCCC) in Doha, that New Zealand is unable to 'transfer and acquire' Kyoto Units valid for the second commitment period unless it invests in CDM projects and earn the relevant CERs directly.[393] Kyoto Units eligible during the first commitment period remained valid instruments of compliance until 18 November 2015 (known as 'true-up period') – the last day of the period in which countries with binding emissions reduction obligation during the first commitment period of the Kyoto Protocol have to retire enough Kyoto Units to comply with their obligations.[394] After the true-up period, Kyoto Units of the first commitment period become ineligible for compliance under the New Zealand ETS except that New Zealand AAUs and RMUs can be carried

390 New Zealand Government, 'Consultation on Proposed Regulations Restricting the Use of HFC-23 and N2O CERs in the NZ ETS' (Ministry for the Environment 2011) Ref Info 624 <http://www.climatechange.govt.nz/consultation/hfc-23-n2o-cers/consultation-document/index.html> accessed 10 December 2015.

391 New Zealand Government, 'Guidance on the use of Emission Reduction Units and Certified Emission Reduction units in the ETS' (Ministry for the Environment 2012) Ref Info 676 <http://www.climatechange.govt.nz/emissions-trading-scheme/building/regulatory-updates/guidance-emission-reduction-units-certified-emission-reduction-units-ets.pdf> accessed 10 December 2015.

392 New Zealand Government, 'Consultation on proposed regulations restricting the use of certain international units in the NZ ETS' (Ministry for the Environment 2012) Ref Info 6070 <http://www.climatechange.govt.nz/consultation/ets/consultation-on-proposed-regs-nzets-units.pdf> accessed 10 December 2015; New Zealand Government, 'Guidance on the use of Emission Reduction Units' (n 366).

393 United Nations Framework Convention on Climate Change (UNFCCC), 'Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its eighth session, held in Doha from 26 November to 8 December 2012. FCCC/KP/CMP/2012/13/Add.1. Decision 1/CMP.8, paras. 12-15.

394 Environmental Protection Authority, 'Kyoto Protocol First Commitment Period True-up process in the Emissions Trading Scheme' (Environmental Protection Authority 2015) Information Sheet <http://www.epa.govt.nz/Publications/Kyoto_Protocol_Trueup_Infosheet.pdf> accessed 10 December 2015.

over to the period beyond 18 December 2015.[395]

5.3.3. The Californian and Quebec cap-and-trade schemes

The Californian cap-and-trade programme and the Quebec cap-and-trade system have been bilaterally linked since 1 January 2014 as part of the Western Climate Initiative – a collaborative framework that aims at implementing multi-state ETSs.[396] Neither scheme accepts international offset credits.[397] With respect to domestic offset credits, each scheme has a separate list of eligible offset credits. The Californian ETS accepts credits from five types of U.S-based projects: U.S. forest projects,[398] urban forest projects,[399] projects capturing and destroying CH_4 from manure management,[400] projects destroying Ozone depleting substances, and mine CH_4 capture projects.[401] A sixth project – rice cultivation – is under

[395] Environmental Protection Authority (n 394); S Bridges, 'Decisions on Kyoto Protocol emission units' (*New Zealand Government*, 6 December 2013) <http://www.beehive.govt.nz/release/decisions-kyoto-protocol-emission-units> accessed 10 December 2015.

[396] See California Air Resource Board and the Gouvernement du Quebec, 'The Harmonisation and Integration of Cap-and-Trade Programs for Reducing Greenhouse Gas Emissions' <http://www.arb.ca.gov/cc/capandtrade/linkage/ca_quebec_linking_agreement_english.pdf> accessed 16 December 2015 (hereafter: California-Quebec Linking Agreement).

[397] California's cap-and-trade programme foresees accepting international credits generated from sectoral crediting mechanisms in developing countries and approved by the CARB. The CARB has yet to approve any such programme. If approved, credits from international sectoral crediting mechanisms could be used to cover up to 2 per cent of a covered entity's compliance obligations during the initial two compliance periods (2013-2017) and up to 4 per cent in the third compliance period (2018-2020). See Cal Code Regs, tit 17, paras 95991-95995 cum para 95854.

[398] California Air Resource Board, 'Compliance Offset Protocol: U.S. Forest Projects' (California Environmental Protection Agency 2015) <http://www.arb.ca.gov/cc/capandtrade/protocols/usforest/forestprotocol2015.pdf> accessed 16 December 2015.

[399] California Air Resource Board, 'Compliance Offset Protocol: Urban Forest Projects' (California Environmental Protection Agency 2011) <http://www.arb.ca.gov/regact/2010/capandtrade10/copurbanforestfin.pdf> accessed 16 December 2015.

[400] California Air Resource Board, 'Compliance Offset Protocol: Livestock Projects – Capturing and Destroying Methane from Manure Management Systems' (California Environmental Protection Agency 2014) <http://www.arb.ca.gov/regact/2014/capandtrade14/ctlivestockprotocol.pdf> accessed 16 December 2015.

[401] California Air Resource Board, 'Compliance Offset Protocol: Ozone Depleting Substances Projects – Destruction of U.S. Ozone Depleting Substances Banks' (California Environmental Protection Agency 2014) <http://www.arb.ca.gov/regact/2014/capandtrade14/ctodsprotocol.pdf> accessed 16 December 2015.

consideration.[402] The Quebec ETS accepts credits from Quebec-based projects for destroying methane (CH_4) emissions from manure and landfill sites and Canada-based projects for the destruction of certain Ozone depleting substances.[403] Both schemes accept credits from their eligible offset projects up to 8 per cent of an entity's verified emissions in a compliance period.[404] Despite the differences in the types of eligible offset projects, each jurisdiction recognises credits accepted by the other jurisdiction.[405]

5.3.4. The Chinese ETSs

China operates pilot ETSs in five provinces (Chongqing, Guangdong, Hubei, Shenzhen, and Tianjin) and two cities (Beijing and Shanghai).[406] All the ETSs generally accept credits from Chinese CDMs. Chongqing ETS allows the use of Chinese CERs only if emissions exceed allocations by a maximum of 8 per cent.[407] Beijing, Chongqing, Guangdong, and Hubei ETSs also require that some or all of the credits be generated from projects hosted within their territories.[408] Credit utilisation limits vary from five per cent (Beijing and Shanghai ETSs) to 10 per cent (Hubei ETS) of an entity's annual allocations to 10 per cent of an entity's annual compliance obligations in Guangdong, Shenzhen, and Tianjin ETSs.[409]

5.3.5. The Korean ETS

The Korean ETS, which commenced on 1 January 2015, bans the use of international credits during its first Phase (2015-2017).[410] Credits from domestic CDM projects

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402 California Air Resource Board, 'Compliance Offset Protocol: Rice Cultivation Projects' (California Environmental Protection Agency 2015) <http://www.arb.ca.gov/cc/capandtrade/protocols/rice/riceprotocol2015.pdf> accessed 16 December 2015.

403 See Regulation respecting a cap-and-trade system for greenhouse gas emission allowances, Decree No 1297-2011 <http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=3&file=/Q_2/Q2R46_1_A.HTM> (hereafter: Quebec Cap-and-Trade System Regulation) s 70.1-70.22 and app D.

404 Cal Code Regs, tit 17, para 95854; Quebec Cap-and-Trade System Regulation, s 20.

405 California-Quebec Linking Agreement, s 6; Cal Code Regs, tit 17, para 95943; Quebec Cap-and-Trade System Regulation, app B.1.

406 SE Weishaar, *Emissions Trading Design: A Critical Overview* (Edward Elgar 2014).

407 ICAP (n 357) 60.

408 ICAP (n 357) 59-62.

409 ICAP (n 357) 59-65.

410 J Kim, 'K-ETS: Facts and Issues: Learning from its First Commitment Year' (presented at Workshop

and other domestic offset schemes that meet international standards may be used to cover up to 10 per cent of an entity's annual compliance obligations.[411] Eligible offset activities include those eligible under the CDM and carbon capture and storage, and the projects must be implemented after 14 April 2010.[412] As of the third phase (2021-2025), international credits will be accepted up to 50 per cent of the maximum offset utilisation limit.[413]

5.3.6. The Australian CPM

The now defunct Australian CPM accorded a preferential treatment to domestic offset credits over international credits.[414] During its fixed-price phase (2012-2015), the CPM banned the use of international credits altogether, but accepted eligible domestic offset credits up to 5 per cent of a liable entity's obligations in a compliance year.[415] During its flexible-prices period (from 2015 onwards), the CPM

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on International Climate Policy after Paris and Marrakesh – Developments in China and Korea and Its Implications for the EU, The Hague, 7 December 2016).

411 Korea Environment Institute, 'Emissions Trading Scheme' (2015) 10, Korea Environmental Policy Bulletin Vol XIII Issue 1 <http://eng.me.go.kr/eng/file/readDownloadFile.do?fileId=133612&fileSeq=1> accessed 23 December 2016; ICAP (n 357) 57; Kim (n 387).

412 ICAP (n 357).

413 Act on the Allocation and Trading of Greenhouse Gas Emission Permits [Act No 11690, 23 March 2013], art 29(2); Enforcement Decree of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits [Presidential Decree No 24429, 23 March 2013], art 38(4); ICAP (n 357).

414 The Australian CPM, in operation from July 2012 to July 2014, covered approximately 300 of Australia's largest polluters from all major sectors except agriculture and forestry. The CPM had a fixed-price phase and a flexible-prices phase. During the fixed-price phase (2012-2015), carbon prices were fixed at AU$23/tCO2 for 2012/13, increasing by 5 per cent annually. The CPM would have transitioned to flexible carbon prices in July 2015. From 2015 to 2018, it would have operated under a price floor and a price ceiling. The price floor was set at AU$15/tCO2 for 2015/16, increasing in real terms by 4 per cent annually. The price ceiling was to be set at AU$20/tCO2 above the expected price of European Union Allowances – the EU ETS's carbon currency – for 2015/16, rising by 5 per cent annually afterwards. L Caripis and others, 'Australia's carbon pricing mechanism' (2011) 2 Climate Law 583; Commonwealth of Australia, *Securing a Clean Energy Future: The Australian Government's Climate Change Plan* (Australian Government 2011).

415 Commonwealth of Australia, *Securing a Clean Energy Future* (n 414) 107-108. Australia's domestic offset programme is known as the Carbon Farming Initiative (CFI). The CFI awards Australian Carbon Credit Units (ACCUs) for emissions reductions or sequestrations realised under the programme. Depending on whether the credited emissions reductions or sequestrations could be counted towards meeting Australia's emissions reduction targets under the Kyoto Protocol or any successor international agreement, ACCUs are categorised into Kyoto and non-Kyoto ACCUs. Only Kyoto-compliant ACCUs were accepted as valid instruments of compliance under the CPM. Non-

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limited the use of eligible international credits to half of a liable entity's emissions in a compliance year, but imposed no quota on the use of credits from the CFI.[416] Finally, during the period the CPM was to operate under a price floor (2015-2018), covered entities wishing to surrender cheap international credits would have paid an international surrender charge that would have been equivalent to the difference between the prevailing price floor and price of the international credit.[417] The charge was designed to ensure that prices of international credits were kept at or above the prevailing price floor. Domestic credits were, by contrast, were exempted from the price floor.

When Australia agreed to link the CPM to the EU ETS in 2012, it had to revise some of its offset provisions.[418] First, it abolished the CPM's price floor and, consequently, the internal surrender charge, ending the preferential treatment accorded to credits from the CFI. Second, the quota on the use of international credits was revised from 50 per cent to 12 per cent of a covered entity's compliance obligation in a compliance period.

5.4. Do different offset provisions impede linking?

The previous Section shows that the policy framework for using offset credits for compliance purposes in domestic ETSs is dotted with qualitative, quantitative and other restrictions. Some of the restrictions are based on the type of the offset projects. For instance, the Californian and Quebec ETSs ban CDM credits altogether while most other ETSs accept CDM credits provided that the credits meet some qualitative, geographic origin or qualitative requirements. Whereas the EU and NZ

Kyoto ACCUs were traded only in voluntary carbon markets. See generally A Macintosh and L Waugh, 'An Introduction to the Carbon Farming Initiative: Key Principles and Concepts' (2012) Centre for Climate Economics and Policy Working Paper 1203, Crawford School of Public Policy, Australian National University <http://ccep.anu.edu.au/data/2012/pdf/wpaper/CCEP1203.pdf> accessed 23 December 2014.

[416] The eligible international credits were CERs, ERUs, and RMUs except that temporary and long-term CERS, ERUs/CERs from nuclear projects, large hydroelectric projects and the destruction of N_2O from adipic acid plants or trifluoromethane were banned. See Commonwealth of Australia, *Securing a Clean Energy Future* (n 414) 107-108.

[417] Clean Energy Act 2011 (No. 131) 2011 (Cth), s 124; Caripis and others (n 414) 591-592 and 595.

[418] See Commission, 'Australia and European Commission agree on pathway towards fully linking Emissions Trading Systems' *European Commission* (Brussels, 28 August 2012) <http://europa.eu/rapid/press-release_IP-12-916_en.htm?locale=en> accessed 8 November 2016.

ETSs ban credits from industrial gas projects and restrict the use of credits from large hydroelectric projects, these credits are accepted in the Chinese and Korean ETSs. The Australian, Californian, Chinese, Korean, and Quebec ETSs provide varying levels of preferential treatment to offset credits be generated from projects in their respective jurisdictions over international credits. The EU ETS also requires that CERs generated as of 2012 must come from LDCs.

The relevant question for linking is whether and how the differences in the offset provisions affect linking ETSs. This Section addresses this issue.

5.4.1. Credit eligibility

As pointed out earlier, differences in the types of offset credits accepted for compliance between to-be-linked ETSs are considered as 'significant challenges for linking.'[419] If ETSs with different credit eligibility requirements link, the intersystem trading in emissions rights allows entities covered under one ETS to comply with credits accepted in their respective scheme, but banned in another linking-partner ETS, and free up corresponding domestic carbon units that could be sold to participants in the linking-partner ETS.[420] Because each linking-partner ETS's least restrictive offset eligibility rules propagate and replace their more restrictive counterparts in other linking-partner ETSs, the linked carbon market will *de facto* operate under a menu of the least restrictive offset eligibility provisions from each linking-partner ETS.

However, the view that differences in credit eligibility requirements 'pose significant challenges for linking' is more about politics than economics. Often, credit eligibility criteria reflect the respective jurisdictions' concerns over the environmental integrity, socio-economic and biodiversity impacts of particular offset projects. In so far as countries set their offset policies unilaterally, they will continue to hold different perspectives on these issues. Credits banned from some ETSs will continue to be accepted in other ETSs even if the ETSs with different credit eligibility requirements remain separate. From the perspective of safeguarding environmental integrity, it is irrelevant whether such credits are used in a domestic ETS or an interconnected supra-national ETS.[421] Either way, the environment will suffer.

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419 Tuerk and others (n 360) 348. See also Jakob-Gallmann (n 365) 140-142; House of Commons Energy and Climate Change Committee (n 365) 14.

420 Jakob-Gallmann (n 365) 140-142.

421 Under some stylised assumptions, however, linking ETSs may increase the quantity of offset credits relative to autarky. See the discussion in Section 5.4.2 below.

While there are potential gains – both economic and political – from the linking ETSs, abandoning linking because of differences in credit eligibility requirements brings no apparent gains. If anything, it would sustain the competitive edge that entities covered under an ETS with lax offset rules enjoy over entities covered under an ETS with more restrictive offset rules.

5.4.2. Credit utilisation limits

As discussed earlier, several jurisdictions impose varying levels of quota on the use of offset credits in their respective ETSs. This Section discusses the efficiency and environmental integrity effects of differences in offset utilisation limits between linking-partner ETSs.

In autarky, the lower the quota on the use of offset credits in an ETS, the higher the efficiency gains (cost savings) from their use. Assuming away considerations other than (static) efficiency,[422] there is a clear economic case for allowing unlimited use of offset credits in an ETS, namely reducing costs of abatement. Linking two (or more) ETSs that enforce different levels of quota on the use of offset credits need not raise efficiency concerns. Given the offset utilisation limits of the linking-partner ETSs, the effect of linking would be to redistribute abatement to wherever it could be achieved at the least possible abatement cost, further enhancing the efficiency linking-partner ETSs.

The environmental integrity implications of differences in credit utilisation limits between linking-partner ETSs vary depending on regulated entities' use of offset credits for compliance in autarky and whether linking increases or decreases allowance prices in the linking-partner ETSs. We could illustrate the implications of these factors for environmental integrity with an example. Assume that two ETSs – *A* and *B* – establish a full bilateral link. Assume further that in both systems regulated entities fully utilise their credit quota before using domestic emissions units for compliance.[423] Assume also that the linking increases allowance prices in *ETS-A* and decreases them in *ETS-B*.

Since offset credits are substitutes for 'regular' emissions allowances, an

[422] See Section 5.4.3 below for a discussion on why policy considerations other than economic efficiency and environmental integrity may become stumbling blocks for linking.

[423] Because offset credits are cheaper instruments of compliance than domestic carbon currencies, it could be reasonably assumed that entities covered under an ETS would exhaust their credit utilisation limits before resorting to buying domestic carbon 'currencies'.

increase (a decrease) in the price of the 'regular' allowances will increase (decrease) the demand for offset credits. As a result of the linking of *ETS-A* and *ETS-B,* the demand for offset credits increases in the former and decreases in the latter. Although entities covered under *ETS-B* are likely to need fewer offset credits than in autarky, they could use up their offset limit and sell the extra units to entities covered under *ETS-A*. This will not, however, increase the aggregate emissions under linking relative to autarky because, as we assumed above, entities covered under each linking-partner ETSs used to use up their credit limits in autarky. In sum, assuming full credit utilisation in autarky, linking ETSs cannot lead to more aggregate emissions than in autarky.

If we dispense with the assumption of 'full credit utilisation in autarky', we will reach a slightly different conclusion. Let's keep the same assumptions as above except that, in autarky, entities covered under *ETS-A* used up their credit limits while entities covered under *ETS-B* used up only part of their credit utilisation quota. If allowance prices rise in *ETS-A* and fall in *ETS-B*, the demand for offset credits will likely rise in *ETS-A* and fall in *ETS-B*. Relative to the level of emissions in autarky, aggregate emissions after linking may increase (if the rise in demand for offset credits from *ETS-A* is greater than the fall in demand (increase in supply) from ETS-B), decrease (if the fall in demand for (increase in supply of) offset credits from *ETS-B* more than offsets the increase in demand from *ETS-A*), or remain the same (if the demand for credits increases and decreases, respectively, in ETS-A and ETS-B by an equal margin).

Finally, the environmental integrity implications of linking an ETS that imposes a quota on the use of offset credits (*ETS-A*) and another without any limit on the use of offsets (*ETS-B*) are different from those discussed above. In autarky, *ETS-A*'s level of emissions in a given compliance period is equivalent to the sum of allowances issued and the number of credits that covered entities are entitled to surrender. In *ETS-B*, by contrast, the level of emissions cannot be known *ex ante* because it depends on, in addition to the number of carbon units issued, the quantity of credits that covered entities choose to surrender in a given compliance period. If *ETS-A* and *ETS-B* are bilaterally linked, entities in *ETS-B* will be able to sell their domestic carbon currencies to *ETS-A* entities and comply entirely with offset credits. The post-linking aggregate emissions could thus increase by as many numbers of allowances issued under *ETS-B*, leading to more aggregate emissions under linking than in autarky.

The thrust of the preceding analysis is that it is not a given that differences in offset utilisation limits between linking-partner jurisdictions undermine environmental integrity. Surely, there are instances in which different offset utilisation limits may undermine environmental integrity. Yet these depend on the type of assumptions one makes about regulated entities' compliance behaviour and how strongly demand for offset credits responds to a post-linking increase or decrease in allowance prices in the linking-partner ETSs. Stated differently, although linking ETSs with different offset utilisation limits may lead to more aggregate emissions than in autarky, the logic for this is more nuanced than explained by the 'backdoor problem' described in the linking literature.

5.4.3. Domestic policy priorities in offsets policy and linking

Countries' offset policies might be shaped by other policy considerations than just only economic efficiency or environmental integrity. For instance, the EU ETS's requirement that CERs generated from projects registered after 2012 must originate from LDCs is more about encouraging advanced developing countries to move beyond pure offsetting mechanisms and embrace sectoral crediting or trading mechanisms than a response to the environmental integrity or socio-economic concerns over offset projects hosted by non-LDC countries.[424] Countries may use linking negotiations strategically as an opportunity to 'export' their perspectives on offsets to other jurisdictions by insisting on harmonisation of credit eligibility requirements.

[424] See the Revised Emissions Trading Directive, recital 31. Sectoral trading functions essentially as a cap-and-trade system. A developing country accepts an absolute emissions target which is below business as usual emissions and receives emissions rights up to the level of the emissions target in much the same way as annex I Parties under the Kyoto Protocol received Assigned Amount Units up to the level of their Kyoto commitments. The country is then allowed to trade in the emissions rights with other nations. The international rules will not prescribe mechanisms of achieving the required emissions target. The relevant country may, for instance, establish a cap-and-trade scheme or use other policy instruments. A sectoral crediting mechanism sets a crediting threshold for a sector or subsector. If the relevant developing country reduces the covered sector's emissions below the pre-defined crediting threshold, the country earns credits which can be sold to other countries. Unlike the sectoral trading approach, the country faces no sanctions for failing to achieve the crediting threshold. See generally W Sterk, 'New Mechanisms for the Carbon Market? Sectoral Crediting, Sectoral Trading, and Crediting Nationally Appropriate Mitigation Actions' (2010) Wuppertal Institute JIKO Policy Paper 4/2010 <http://wupperinst.org/en/publications/details/wi/a/s/ad/1283/> accessed 16 December 2015.

Similarly, differences in offset policies may also reflect inconsistencies in the linking-partner's climate and energy policy priorities. A jurisdiction that aspires to transform its economy into a low-carbon future quickly, to create an internationally competitive low-carbon industry, and to reduce reliance on fossil fuels may require that a large share of the overall abatement be realised domestically, leading to tighter quantitative restrictions on the use offsets than a jurisdiction that aims at just achieving a given emissions reduction target at the lowest possible cost. Although differences in credit utilisation limits may not undermine the efficiency and environmental integrity of the linked carbon market, establishing linking may become challenging because of the jurisdictions' different policy priorities.

The challenges arising from different offset utilisation limits of linking-partner jurisdictions highlight a trade-off between some policy priorities and linking ETSs. A policy that sets strict offset utilisation limits to encourage regulated entities to realise a certain share of the overall abatement domestically is inconsistent with the economic intuition of linking as a free trade ideal. The central economic promise of linking ETSs lies in that it helps linking-partner jurisdictions to achieve their aggregate emissions reductions at the least possible abatement cost. This necessarily requires that entities with the lowest marginal cost of abatement realise a larger share of the overall abatement. Because linking ETSs inevitably redistributes abatement between the linking-partner jurisdiction, lead to more abatement being realised in one jurisdiction than in the other, it requires trading off a policy priority of realising a specified share of the overall abatement domestically with realising the overall abatement at the least possible cost.

This trade-off was seen in practice when Australia and the EU agreed in 2012 to link up their ETSs from 2015. Before the linking agreement, CFI credits enjoyed a preferential treatment over other carbon units, signalling the government's aim to encourage abatement from sectors participating in the CFI. The exemption meant that entities covered under the CPM were incentivised to prefer CFI credits over other emissions units until, at least, the price for CFI credits went above the price floor. The linking agreement resulted in the abolition of the CPM's price-floor and the international surrender charge, removing CFI credits' shield from international competition and trumping the policy of encouraging abatement from sectors participating in the CFI.[425] To be sure, the linking would have allowed Australia to

[425] See Point Carbon, 'Australia Offset Scheme Hits Milestone but Future Uncertain' *Thompson Reuters* (Oslo,

achieve its emissions reduction target at a significantly lower abatement cost than the pre-linking scenario. Following the announcement of the linking agreement, the expected carbon price in Australia for 2015 dropped from approximately A\$30/tCO_2 to A\$12/tCO_2, suggesting significant differences in marginal abatement costs between the EU and Australia and the gains from trade as a result of the linking agreement.[426]

5.5. Conclusion

This Chapter reviewed the offset provisions of several ETSs and found significant differences in their offset provisions. The differences relate to the types of accepted credits (credit eligibility), the number of credits that covered entities could use in a compliance year (credit utilisation limits), and other restrictions such as requirements that credits be generated in particular countries or regions. The Chapter then discussed the efficiency and environmental integrity consequences, if any, of linking ETSs with different offset provisions. The aim was to assess if the claim in the linking literature that differences in offset provisions are likely to pose 'significant challenges' for linking is grounded in welfare analysis.

As explained before, differences in offset eligibility requirements between to-be-linked ETSs do not raise efficiency concerns. Nor do they undermine environmental integrity especially if we assume that regulated entities under the linking partner ETSs would use up their respective quota in autarky. To be sure, there are instances in which linking ETSs with different credit utilisation limits may lead to more aggregate emissions under linking than in autarky. Although this supports the claim that differences in offset provisions between linking-partner ETSs are likely to pose significant challenges for linking, it holds true only under specified assumptions about regulated entities compliance behaviour and the effect of linking on pre-linking allowance prices in the linking-partner ETSs. The assertion in the linking literature that differences in offset provisions create a 'back-door problem' is far from a general statement of truth.

Differences in offset provisions may, however, preclude linking if they are reflections of inconsistent climate policy priorities of the linking-partner

13 December 2013) <http://www.pointcarbon.com/polopoly_fs/1.3366648!CMANZ20131213.pdf> accessed 11 February 2014.

426 Point Carbon, 'Australia Takes A\$6 Billion Write-down after EU CO2 Price Fall' *Thompson Reuters* (Oslo, 24 May 2013) <http://www.pointcarbon.com/polopoly_fs/1.2386086!cmanz20130524.pdf> accessed 11 February 2014.

jurisdictions. It is not inconceivable that a jurisdiction may want to use its ETSs as an instrument of driving innovation and investment in low-carbon technology. Another jurisdiction may, on the other hand, may want to use its ETS to just achieve a given emissions reduction target at the least possible abatement cost. The former is likely to impose a tighter limit on the use of offset credits than the latter. With linking, the generous credit utilisation limits of the latter may undermine the policy priorities of the former, potentially posing a challenge for linking. Even under such cases, the challenge for linking does not stem from different credit utilisation limits per se; but rather from inconsistent climate policy priorities of the linking-partner jurisdictions.

In sum, in as far as countries continue to set their offset policies, offset policies are likely to remain different. These differences, however, need not impede linking as their efficiency and environmental integrity implications are, for the most part, independent of linking. In this regard, the linking between the Californian and Quebec cap-and-trade schemes – carbon markets with significant differences in their offset policies – could provide a valuable lesson for other jurisdictions.

6
Climate Policy Durability and Linking

6.1. Introduction

The durability of linking-partner emissions trading systems (ETSs) is vital both from an efficiency and governance perspective. A linked carbon market that is durable is likely to enhance dynamic efficiency by enabling firms to plan ahead and take into account the policy in their operational and investment decisions. If, however, firms expect that any of the linking-partner ETSs is likely to unravel, they will defer investments until the uncertainty relating to the durability of the ETS is resolved, or they require higher rates of return. Also, if linking-partner jurisdictions can anticipate the unravelling of either of their ETSs, they might be able to organise the linking agreement in such a way that it imposes high costs of exit, thereby using the linking agreement as a commitment device.

The global emissions trading landscape has seen both politically sustainable and unsustainable ETSs. The EU ETS, up and running since 2005, remains the world's largest and oldest mandatory cap-and-trade system. It remains a central pillar of EU climate policy. By contrast, the Australian Carbon Pricing Mechanism (CPM), a hybrid system combining features of a tax and an ETS, entered into force in July 2012 and was abolished in 2014.[427] Both the enactment and durability of the EU ETS and the quick unravelling of the Australian CPM are peculiar for several reasons.

[427] See Clean Energy Legislation (Carbon Tax Repeal) Bill 2014 (Cth) (hereafter: Carbon Tax Repeal Bill).

One would intuitively expect that the complex institutional architecture of the EU, with its multiple veto players with diverse interests and preferences,[428] would make climate governance difficult. Second, the enactment of the EU ETS was preceded by fierce opposition in the 1990s by both Member States and businesses against an EU-wide carbon tax proposed by the European Commission.[429] Third, the EU ETS has faced several post-enactment challenges that could potentially undermine its credibility and political sustainability. These include an over-allocation problem in Phase I (2005-2007) that precipitated the allowance price crash of April 2006,[430] a controversy over the free allocation of allowances especially to electricity generators that were able to pass on the costs of carbon to electricity consumers (the issue of windfall profits),[431] and a glut in the supply of allowances that depressed allowance prices since 2008.[432]

The quick unravelling of the Australian CPM is no less peculiar than the enactment and durability of the EU ETS. The Australian CPM was designed with an eye on making it prosper in an uncertain political future. It included design features that were welcomed as 'institutional innovations.'[433] These include a system of cap-setting that combines flexibility and predictability;[434] an independent Climate Change Authority (CCA) that was expected to instil flexibility to the CPM and lend

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[428] Tsebelis defines veto players as 'actors whose agreement is required for a change of the status quo.' G Tsebelis, *Veto Players: How Political Institutions Work* (Russell Sage Foundation and Princeton University Press 2002) 17. The veto players could be institutional or partisan. Institutional veto players, such as parliament, are usually specified by the country's constitution. Partisan veto players, on the other hand, often result from a country's political system such as parties in a coalition government.

[429] See text to notes 472–474 below.

[430] D Ellerman, C Marcantonini and A Zaklan, 'The EU ETS: Eight Years and Counting' (2014) 11, EUI Working Paper RSCAS 2014/04 <http://cadmus.eui.eu/bitstream/handle/1814/29517/RSCAS_2014_04.pdf> accessed 8 December 2015. See also T Jong, O Couwenberg and E Woerdman, 'Does EU Emissions Trading Bite? An Event Study' (2014) 69 Energy Policy 510.

[431] See E Woerdman, O Couwenberg and A Nentjes, 'Energy prices and emissions trading: windfall profits from grandfathering?' (2009) 28 European Journal of Law and Economics 185.

[432] Commission, 'Impact assessment accompanying the document concerning the establishment and operation of a Market Stability Reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC' COM (2014) 20 final. See also SE Weishaar, 'Incentivising Technologic Change in Emissions Trading Systems: The Case of Excess Supply' in L Kreiser and others (eds), *Environmental Taxation and Green Fiscal Impact: Theory and Impact* (Edward Elgar 2014).

[433] L Caripis and others, 'Australia's Carbon Pricing Mechanism' (2011) 2 Climate Law 583, 587-589.

[434] See text to notes 550–553 below.

scientific integrity to Australia's climate policy;[435] several revenue recycling schemes that aimed at building new constituencies and turning adversaries of the CPM into policy clientele by forcing them to shoulder short-term costs.[436] The Australia-EU agreement in 2012 to link their respective ETSs in 2015 could also theoretically create an external institutional constraint, increasing the costs of unravelling the CPM.[437]

Although it seems intuitive to expect the enactment of the EU ETS to face more hurdles than that of the Australian CPM due to the EU's complex institutional architecture and businesses' opposition against the carbon tax proposed in the 1990s, the politics of enacting the Australian CPM was in fact more fraught than that of the EU ETS. Although the CPM's 'institutional innovations', its revenue recycling schemes, and its link with the EU ETS should make, at least in theory, its unravelling cumbersome and costly (by erecting institutional hurdles, creating constituencies whose benefit hinge on its sustainability and generating a self-reinforcing cycle of positive policy feedback), neither was able to shield it from its ultimate demise. Finally, whereas the EU ETS's post-enactment challenges could potentially undermine its credibility and sustainability, the EU ETS has in fact navigated through the challenges by adopting several reforms.

This Chapter aims to identify factors that explain the durability of the EU ETS and the unravelling of the Australian CPM. In doing so, it draws on two distinct strands of literature: credible commitments and veto players. The literature on credible commitments focuses on commitment devices such as voting rules and delegation to an independent agency as mechanisms of increasing the costs of unravelling a policy. The veto players literature focuses on political polarisation among relevant veto

[435] Caripis and others argue that the establishment of the CCA 'engenders some confidence in the scope for improvement of the [CPM]'. See Caripis and others (n 433) 588. Keenan and others also argue that the CCA 'provides some assurance that caps and emissions-reduction targets will be informed by the latest science and have scientific integrity.' See RJ Keenan and others, 'Science and the Governance of Australia's Climate Regime' (2012) 2 Nature Climate Change 477, 477.

[436] See text to notes 576–582 below.

[437] See Commission, 'Australia and European Commission agree on pathway towards fully linking Emissions Trading Systems' *European Commission* (Brussels, 28 August 2012) <http://europa.eu/rapid/press-release_IP-12-916_en.htm?locale=en> accessed 8 November 2016 (hereafter: Australia-EU Linking Agreement). See also S Brunner, C Flachsland and R Marschinski, 'Credible Commitment in Carbon Policy' (2012) 12 Climate Policy 255, 268; WA Pizer and AJ Yates, 'Terminating Links between Emission Trading Programs' (2015) 71 Journal of Environmental Economics and Management 142, 145.

players in a given political system as a constraint on policy change. Instead of using each strand of literature as an alternative explanation to policy (un)sustainability, we assess the dynamics between the two, analysing the effect political polarisation may have on the success of commitment devices as mechanisms of making policy change cumbersome and costly.[438]

The Chapter is organised as follows. Section 6.2 describes the politics of pricing carbon in Australia and the EU. Section 6.3 outlines our analytical framework drawing on veto players theory and credible commitments literature. Section 6.4 applies the theoretical framework and examines why the EU ETS has proved durable while the Australian CPM unravelled. It also outlines the interface between policy durability and linking ETSs. Section 6.5 concludes.

6.2. The comparative politics of pricing carbon

The politics of pricing carbon in Australia has been more partisan and polarised than in the EU. In the following, we explain the history of climate politics in both jurisdictions focusing on their main political actors.

6.2.1. The politics of pricing carbon in Australia

Australia is one of the most carbon-obese countries in the world, with the second highest emissions per capita in the OECD area.[439] A highly emissions-intensive energy production, an economy that specialises in the export of emissions-intensive primary products, and soaring emissions from transport largely account for the Australia's exceptionally high per capita emissions.[440] Despite a growing public anxiety about

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[438] For a similar approach, see T Frye, 'The Perils of Polarisation: Economic Performance in the Post-Communist World' (2002) 54 World Politics 308; P Keefer and D Stasavage, 'The Limits of Delegation: Veto Players, Central Bank Independence, and the Credibility of Monetary Policy' (2003) 97 American Political Science Review 407; M Breen and I McMenamin, 'Political Institutions, Credible Commitment, and Sovereign Debt in Advanced Economies' (2013) 57 International Studies Quarterly 842.

[439] Organisation for Economic Cooperation and Development (OECD), 'Air and GHG Emissions Indicator' (2016), doi: 10.1787/93d10cf7-en, accessed on 26 December 2016.

[440] Energy emissions (stationary energy, transport and fugitive emissions) accounted for approximately 78 per cent of Australia's aggregate emissions in 2014. Between 1990 and 2014 emissions from stationary energy and transport increased by, respectively, 40.6 per cent and 51.3 per cent. See Commonwealth of Australia, *National Inventory Report 2014 (Revised)* (Australian Government 2013, vol. 1) 31-33. Minerals and fuels, especially, iron ore and coal made up nearly half (48.1 per cent) of Australia's exports in 2014. Department of Foreign Affairs and Trade, *Trade at a Glance 2015* (Australian Government 2015) 2-6.

climate change since the early 1980s – the period the Australian government was first alerted to climate change, Australia failed to take decisive action against climate change.[441] This has largely to do with the country's highly partisan climate politics that has made climate governance challenging.

Australia has a long history of a highly partisan climate politics with the two major parties – the Coalition and Labor – rarely supporting each other's climate policy initiatives. Throughout the 1980s and 1990s, neither party had any impressive climate policy accomplishments. Domestic climate policy initiatives remained 'sporadic and piecemeal', and 'governments were only really concerned to appear concerned, to placate public opinion while doing nothing to confront the real problems.'[442] Internationally too, Australia has been a climate laggard. Emblematic of this was Australia's refusal to ratify the Kyoto Protocol in 2002 under John Howard's Coalition-led government. Howard argued that it was not in the interest of Australia to ratify the Kyoto Protocol because of its highly emissions-intensive economy.[443]

The 2007 federal election was primarily fought on the issue of climate change.[444] Kevin Rudd, then Labor leader, cunningly used climate change to his electoral advantage and promised a raft of climate policy reforms including ratifying the Kyoto Protocol and launching an ETS.[445] Cornered by Labor's aggressive campaign, the Coalition-led government promised to introduce an ETS. This was, however, regarded as 'too little too late'.[446] In what was later defined as 'Australia's first climate change election', [447] the Coalition lost to Labor and Rudd became prime minister.

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441 V Burgmann and HA Baer, *Climate Politics and the Climate Movement in Australia* (Melbourne University Press, 2012) 53-54.

442 Burgmann and Baer (n 441) 54-56.

443 P Lawrence, 'Australian Climate Policy and the Asia-Pacific Partnership on Clean Development and Climate (APP). From Howard to Rudd: Continuity or Change?' (2009) 9 International Environmental Agreements 281, 284. See also G Pearse, *High and Dry: John Howard, Climate Change and the Selling of Australia's Future* (Viking 2007) 131.

444 Burgmann and Baer (n 441) 62-67.

445 P Kelly, *Triumph and Demise: The Broken Promise of a Labor Generation* (Melbourne University Press 2014) 130-131.

446 Burgmann and Baer (n 441) 60.

447 A Brohé, N Eyre and N Howarth, *Carbon Markets: An International Business Guide* (Earthscan 2009) 199-206; Burgmann and Baer (n 441) 62-67. For a different perspective, see C Rootes, 'The First Climate Change Election? The Australian General Election of 24 November 2007' (2008) 17 Environmental Politics 473.

In December 2007, Rudd ratified the Kyoto Protocol. In late 2008, the Labor-led government floated a proposal to launch a national ETS, known as the Carbon Pollution Reduction Scheme (CPRS).[448] However, the CPRS came under fire from all quarters.[449] Brendan Nelson, who replaced John Howard as leader of the Coalition, initially rejected the CPRS to later reverse his position under the influence of his party members, leading to his ouster by Malcolm Turnbull in September 2008.[450] The fossil fuel industry lamented the CPRS as hurting the Australian economy by pricing carbon before Australia's major trading partners, notably in the adjacent Asia-Pacific region, would take similar policy measures.[451]

The Greens, on the contrary, argued that the mid-term and long-term emission reduction targets were not ambitious enough and that the industry assistance scheme was overly generous.[452] The Greens instead proposed a transitional fixed carbon price starting at A$23 per tonne of CO_2 until a more ambitious ETS would be launched.[453] Rudd rejected the Greens' proposal and chose to negotiate with the Coalition.[454] Following the negotiation, Malcolm Turnbull, leader of the Coalition, backed the CPRS in exchange for an increase in the industry assistance schemes and a decrease of the role of auctioning in allowance allocation.[455] Despite these revisions and backing from Malcolm Turnbull, the Greens sided with Coalition backbenchers and voted down the CPRS in the Senate.[456]

Turnbull's support for the CPRS proved unpopular within his own Party,

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448 Commonwealth of Australia, 'Carbon Pollution Reduction Scheme: Green Paper' (Australian Government 2008).

449 K Crowley, 'Climate Policy Failure: Was Australia's CPRS More Politics than Policy?' in K Crowley and KJ Walker (eds), *Environmental Policy Failure: The Australian Story* (Tilde University Press 2011) 35-36.

450 Kelly (n 445) 240.

451 I Bailey and others, 'The Fall (and Rise) of Carbon Pricing in Australia: A Political Strategy Analysis of the Carbon Pollution Reduction Scheme' (2012) 21 Environmental Politics 691, 697.

452 S Brenton, 'Policy Traps for Third Parties in Two-Party Systems: The Australian Case' (2013) 51 Commonwealth and Comparative Politics 283, 296.

453 Burgmann and Baer (n 441) 117. See also Point Carbon, 'Greens Push Government on Carbon Levy', *Thompson Reuters* (Oslo, 23 April 2010) <http://www.pointcarbon.com/polopoly_fs/1.1438881!CMANZ20100423.pdf> accessed 11 February 2014.

454 Burgmann and Baer (n 441) 117-118.

455 Burgmann and Baer (n 441) 75-76. See also Bailey and others (n 451).

456 Burgmann and Baer (n 441) 79*;* Brenton (n 452) 296.

leading to his ouster by Tony Abbott in December 2009.[457] Abbott rejected the proposed CPRS. Amid continued opposition, Rudd finally shelved the CPRS in April 2010. Rudd was accused of abandoning his signature issue without much of a fight.[458] In June 2010 – just months before the 2010 election – he was deposed by his deputy, Julia Gillard, in an internal leadership contest.

The 2010 election led to the first hung parliament in 70 years with no major party winning a majority in the House of Representatives to form a government. Unlike the large parties, the Greens enjoyed the best electoral results on record, getting a seat in the House of Representatives for the first time in their history and increasing their Senate seats to record numbers.[459] Labor managed to negotiate a deal with the Greens and three independent MPs and formed a minority government. As part of the coalition agreement, Labor agreed to tackle climate change and that this 'will require a price on carbon'.[460] In September 2010, a Multi-Party Climate Change Committee (MPCCC) was formed to explore options for implementing a carbon price. The Coalition refused to be represented in the Committee.

In July 2011, the Committee released a Clean Energy Agreement which recognises emissions trading as the most cost-effective mechanism for reducing Australia's emissions.[461] The Clean Energy Act, which included the Australian CPM, was finally passed by parliament in November 2011. The introduction of the CPM, which included a three-year fixed-price period starting at A\$23/tCO_2, triggered a storm of opposition mainly from the Coalition and the fossil fuel industry.[462] The leader of the Coalition, Tony Abbott, vowed to dismantle the CPM if elected in the (then upcoming) 2013 election. He accused Julia Gillard of breaking a promise of 'no carbon tax under the government I lead' that she made in the lead up to the 2010 election.[463]

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457 Kelly (n 445) 241-265.

458 Kelly (n 445) 282-294.

459 C Rootes, 'Denied, Deferred, Triumphant? Climate Change, Carbon Trading and the Greens in the Australian Federal Election of 21 August 2010' (2011) 20 Environmental Politics 410, 413-414.

460 — — *The Australian Greens & the Australian Labor Party Agreement* (1 September 2010) <http://braidwood.nsw.greens.org.au/2010/09/01/australian-greens-labor-commit-to-agreement-for-stable-government> accessed 7 April 2014.

461 Commonwealth of Australia, 'Multi-Party Climate Change Committee Clean Energy Agreement' (Australian Government 2011).

462 — — 'Australia's Carbon-Tax Drama' (2011) 17 Strategic Comments 1.

463 quoted in 'Australia's carbon-tax drama' (n 462) 2.

In the lead up the 2013 federal election, the Coalition successfully pitched the issue of pricing carbon as an economic one that threatens Australia's economic prosperity.[464] Gillard's popularity plummeted in the lead up to the election, culminating in her ouster in June 2013 by Kevin Rudd – the man she deposed in 2010. Although Rudd proposed to end the CPM's fixed-price period a year earlier to quell concerns about the relatively high initial carbon price – a rallying issue for critics of the CPM, Labor lost the election to the Coalition.[465] Abbott honoured his promise and abolished the CPM on 17 July 2014.[466]

6.2.2. The politics of pricing carbon in the EU

Climate policy arrived on the EU's institutional agenda in the mid-1980s.[467] During the early years, Member States took the lead by setting unilateral policy targets for reducing/stabilising their emissions.[468] In March 1990, the European Commission proposed a common target of stabilising emissions at 1990 levels by 2000. The Council endorsed the proposal in November 1990.[469] In the words of Jordan and Rayner, 'the EU's leadership aspirations were … rapidly becoming more ambitious and more concrete.'[470] Underlying such leadership has been 'a dynamic process of competitive multilevel reinforcement among the different political poles' that included a group of pioneering Member States, the European Parliament, and the

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[464] See Kelly (n 445) 270-274.

[465] The Australian, 'Kevin Rudd Shifts to Emissions Trading Scheme' *The Australian* (Sydney, 14 July 2013) <http://www.theaustralian.com.au/news/kevin-rudd-shifts-to-emissions-trading-scheme/story-e6frg6n6-1226679039589> accessed 17 June 2014.

[466] See Carbon Tax Repeal Bill.

[467] A Jordan and T Rayner, 'The Evolution of Climate Policy in the European Union: A Historical Overview' in A Jordan and others, *Climate Change Policy in the European Union: Confronting the Dilemmas of Mitigation and Adaptation?* (Cambridge University Press 2010) 53.

[468] By 1990 Sweden, the Netherlands, UK, Denmark and Italy had already set unilateral emissions reduction targets. See Jordan and Rayner (n 467) 56; M Paterson, *Global Warming and Global Politics* (Routledge 1996) 40.

[469] See Jordan and Rayner (n 467) 57.

[470] See Jordan and Rayner (n 467) 56. However, EU's approach towards a quantified and legally binding emission reduction/stabilisation target was greeted with scepticism or, worse, fierce opposition from other developed nations notably the United States, Japan and Russia. The latter questioned EU's approach in light of uncertainties in the science of climate change at the time. See Jordan and Rayner (n 467) 58. See also F Yamin, 'The Role of the EU in International Climate Negotiations' in J Gupta and M Grubb (eds), *Climate Change and the European Leadership: A Sustainable Role for Europe?* (Kluwer Academic 2000) 49.

Commission.[471]

The adoption of the common emission target was also significant because the Commission was mandated to explore and propose policies to achieve the common emissions target, opening the door for discussions on instrument choice. The Commission floated several policy options including energy conservation and efficiency measures, the development of renewable energies, and an EU-wide carbon/energy tax.[472] While the other proposed measures were less controversial, the carbon/energy tax 'proved far too radical for the majority of Member States to stomach.'[473] It triggered a storm of opposition and an intense lobbying by businesses. On 26 May 1992, the Council failed to reach unanimity on the proposed tax, leading to the protest resignation of the Environment Commissioner, Ripa di Meana, just before the Rio Earth Summit.[474]

Emissions trading had not been on the EU's policy menu until after the Kyoto Protocol of 1997. The EU attempted unsuccessfully to exclude emissions trading from the Protocol fearing that it might endanger environmental integrity and might be used by rich countries to buy their way out of emissions reductions.[475] Post-Kyoto, a previously emissions trading-sceptic EU quickly embraced emissions trading. A number of factors contributed to a change of heart over the issue of emissions trading.

Following the signing of the Kyoto Protocol, the DG Environment saw a change in personnel, leading to the replacement of old staff that favoured command-and-

[471] MA Schreurs and Y Tiberghien, 'European Union Leadership in Climate Change: Mitigation through Multilevel Reinforcement' in K Harrison and L Sundstrom (eds), *Global Commons, Domestic Decisions: The Comparative Politics of Climate Change* (The MIT Press 2010) 26.

[472] Jordan and Rayner (n 467) 58-59.

[473] Jordan and Rayner (n 467) 59.

[474] See JB Skjærseth and J Wettestad, *EU Emissions Trading: Initiation, Decision-Making and Implementation* (Ashgate 2008) 32.

[475] In the lead-up to Kyoto, the United States expressed willingness to accept in principle a quantified and legally binding emissions reduction commitment subject, however, to the availability of maximum flexibility such as emissions trading. The EU was deeply suspicious of the idea of flexibility because of its fear that it may endanger the environmental integrity of the international climate policy architecture under the umbrella of the United Nations Convention on Climate Change (UNFCCC), and that it may give rich countries the opportunity to buy their way out of their emissions reduction commitments. The EU later accepted the inclusion of international emissions trading in the Kyoto Protocol and other flexible mechanisms to engage the United States into signing the Protocol. See Skjærseth and Wettestad (n 474) 32-35; 65-67.

control instruments with economists with a natural inclination towards market-based instruments.[476] The new bureaucrats played the central role in firmly planting emissions trading on the EU's institutional agenda.[477] The policy entrepreneurship of a few Member States, notably Denmark, the Netherlands and the UK, complemented the Commission's leadership.[478] Denmark had already launched a domestic ETS in 2000. The UK government also launched its ETS in 2002. These domestic initiatives created pressure from below for an EU-wide carbon market.[479] Emissions trading was also preferred from an institutional perspective in that it could be adopted, unlike a carbon tax that needed unanimity, by a qualified majority in the Council.[480]

In 2000 the Commission floated the Green Paper to establish an EU-wide carbon market.[481] The Green Paper implicitly argued for a centralised ETS with a harmonised system of cap-setting and the auctioning of allowances.[482] During the ensuing consultations, the green paper enjoyed broad-based support from Member States, businesses, and other stakeholders.[483] The European Parliament (hereafter, the Parliament) also favoured a centralised ETS and a mandatory auctioning of a share of the overall allowance pool.[484] Businesses and several Member States, on the other hand, preferred a decentralised ETS with the free allocation of allowances.[485]

When the ETS Directive (2003/87/EC) was passed in October 2003, the ETS adopted a decentralised approach with Member States entrusted with decisions relating to allocation and cap-setting with some guidance from the Commission.[486]

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476 Skjærseth and Wettestad (n 474) 74.

477 DA Ellerman, F Convery and C de Perthuis, *Pricing Carbon: The European Union Emissions Trading Scheme* (Cambridge University Press 2010) 26-28; J Meckling, *Carbon Coalitions: Business, Climate Politics, and the Rise of Emissions Trading* (The MIT Press 2011) 114-118.

478 Schreurs and Tiberghien (n 471) 40-42; Meckling (n 477) 114-118.

479 Meckling (n 477) 104.

480 Skjærseth and Wettestad (n 474) 74.

481 See Commission, 'Green Paper on Greenhouse Gas Emissions Trading within the European Union', COM (2000) 87 final.

482 COM (2000) 87 final, 11-19.

483 See, generally, Skjærseth and Wettestad (n 474) 103-158.

484 Ellerman, Convery and de Perthuis (n 477) 24.

485 Skjærseth and Wettestad (n 474) 41 and 106.

486 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC [2003] OJ L275/32 arts 9 and 11 (hereafter: ETS Directive).

Rather than a mandatory auctioning of a share of the overall allowance pool, Member States were allowed to auction a limited percentage of allowances.[487]

6.2.3. Explaining Australia's polarised climate politics

Australian climate politics – both pre- and post-enactment of the CPM – has been highly partisan. Between 2007 and 2013 alone, climate politics contributed to the downfall of five leaders of the two major political Parties – three from the Coalition and two from Labor. Both Labor and the Coalition rarely supported each other's climate policy initiatives. Labor has been an advocate of an ETS in its purest form.[488] The Coalition, on the other hand, supported neither an ETS, a carbon tax, nor any combination thereof.

In contrast, the pre-enactment level of political polarisation of the EU ETS can be characterised as low relative to that of the Australian CPM. The EU institutions played a mutually reinforcing leadership role during the design and adoption of the EU ETS.[489] The Parliament was proactive both in supporting the Commission's

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487 ETS Directive, art 10; SE Weishaar, *Towards Auctioning: The Transformation of the European Greenhouse Gas Emissions Trading System. Present and Future Challenges to Competition Law* (Kluwer Law International 2009) 98-101.

488 Although the Australian CPM – a hybrid scheme combining features of an ETS with a tax – was passed under a Labor-led government, Labor has never enthusiastically embraced the idea of a fixed carbon price. Before the 2010 election, Rudd's Labor-led government dismissed the Greens' call for a fixed carbon price. After establishing a parliamentary coalition with the Greens following the 2010 election, Labor had to give in to the Greens' demand for an inclusion of a fixed-price scheme in the new climate policy. Julia Gillard was quoted as saying that 'she would prefer to move straight to an emissions trading scheme, but that a period of fixed pricing is necessary to accommodate the Greens.' See Point Carbon, 'Australia Needs A$60 Carbon Price in 2020: Report' *Thompson Reuters* (Oslo, 25 March 2011) <http://www.pointcarbon.com/polopoly_fs/1.1521533!CMANZ20110325.pdf> accessed 11 May 2014. See also Burgmann and Baer (n 441) 82 and 117-118; The Australian, 'Labor to Stand by Emissions Trading Scheme, Says It Won't be Bullied by Tony Abbott' *The Australian* (Sydney, 1 November 2013) <http://www.theaustralian.com.au/national-affairs/policy/labor-to-stand-by-emissions-trading-scheme-says-it-wont-be-bullied-by-tony-abbott/story-e6frg6xf-1226751373905> accessed 17 June 2014.

489 Schreurs and Tiberghien argue that the cycle of reinforcing leadership was 'triggered by and dependent on the public's strong support and normative commitment' to action on climate change. Schreurs and Tiberghien (n 471) 26. That climate politics was less partisan in the EU than in Australia should not, however, be construed to mean that there is a unified interest behind the climate agenda in the EU. There were different 'camps' with differing perspectives in the EU too. As Skjærseth explains, there were deep divisions between 'greener' Member States such as Denmark and the Netherlands, on the one hand, and the southern Member States such as Greece, Portugal and Spain, on the other. Despite

proposals for an EU-wide carbon market and in serving as a channel for green interests to influence the EU's climate policy.[490] The Commission saw climate change policy as a means of empowering itself 'with new regulatory tools and monitoring powers',[491] 'deepen political integration within Europe, … [and] enhance EU's credibility overseas.'[492]

That the politics of pricing carbon has been more polarised in Australia than in the EU might be explained by electoral contestation and advantage. The EU institutions are not subjected to anything near the level of electoral competition on European issues compared to Australia. The supranational structure of the EU helped in shielding the EU institutions from the kind of electoral competition seen in Australia, sheltering climate policy from being used as an electoral ploy and dampening political polarisation over climate policy.

The issue of pricing carbon has been firmly in the firing line of Australian electoral politics since 2007. Both the Coalition and Labor attempted to carve out a distinct profile and gain electoral advantages from climate change. In 2007 Labor capitalised on the Coalition's rejection of the Kyoto Protocol and won the election.[493] Gillard's promise in the lead up to the 2010 election not to price carbon without first establishing 'a deep and lasting community consensus'[494] was also aimed at taking away potential electoral benefits from the Coalition by neutralising the issue of pricing carbon at a time when public support for climate change policy was fading following the disappointing results of the 2009 Copenhagen climate conference.[495]

Similarly, the Coalition attempted to use the issue of pricing carbon to get electoral advantages over Labor. As the Coalition is close to the fossil fuel industry,

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this, climate policy development at the early stage had proceeded 'remarkably rapidly and smoothly.' See JB Skjærseth, 'The Climate Policy of the EC: Too Hot to Handle?' (1994) 32 Journal of Common Market Studies 25, 27. See also Meckling (n 477) 103-131.

490 Schreurs and Tiberghien (n 471) 40.

491 Schreurs and Tiberghien (n 471) 39.

492 Jordan and Rayner (n 467) 56. See also Schreurs and Tiberghien (n 471) 39.

493 See Kelly (n 445) 131-132.

494 Quoted in Kelly (n 445) 342.

495 Surely, it is Gillard's Labor-led government that saw the introduction of the CPM. However, had it not been for the contingent majority that Labor held following the 2010 election, it is doubtful if the CPM would have been legislated, at least, as early as it did. After all, Labor shunned The Greens while negotiating the CPRS and rejected their proposed fixed carbon price – a key feature of the CPM. See Burgmann and Baer (n 441) 117-118; Kelly (n 445) 271.

supporting the pricing of carbon, so the argument went, would alienate it from its support base.[496] Howard's proposal to introduce an ETS starting in 2011 in the lead up to the 2007 election was a response to the then public craze for climate change policy.[497] The party infighting over supporting or opposing Rudd's CPRS was primarily on differences as to which stance would translate into a better electoral outcome in the (then upcoming) 2010 election.[498]

6.3. Conceptualising policy durability

In general, public policies suffer from a credibility deficit, and a climate policy is no exception. A government that enacts a policy may not remain in power forever to protect it from unravelling. If the government loses power, forces opposed to the policy will assume power and can try to unravel the policy.[499] This is known in the literature as political uncertainty/instability variant of the credible commitment problem. Even if political actors that saw the policy enacted remain in office, their interests and preferences may change over time, and they may try to undermine 'their' policy by adopting amendments or repealing it altogether.[500] This variant of the credible commitment problem arises because of time-inconsistent incentives facing political actors.[501] Patashnik explains in the context of American politics that

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[496] It could also be argued that the Coalition's opposition against pricing carbon was also rooted more in ideology than in electoral contestation and advantage. Yes, the Coalition is not only known to harbour climate change sceptics, but it also used to treat emissions trading as 'an ideological issue, a left-wing agenda to constrain economic freedom in the name of a suspect cause.' See Pearse (n 443) 133. However, if the Party's policy flip-flop on the issue since the 2007 election shows anything, it must be that ideology played, at best, a marginal role in the Coalition's stance over carbon pricing.

[497] Burgmann and Baer (n 441) 60.

[498] Some members, notably Turnbull, argued that supporting the CPRS would neutralise the issue, allowing the Coalition to fight Labor on the issue of the economy. Others argued against supporting the CPRS anticipating failure to agree a binding international agreement on climate change at the 15th Conference of the Parties (COP-15) in Copenhagen in 2009 would help the Coalition to pitch the issue of pricing carbon as an economic one that threatens Australia's prosperity. See Kelly (n 445) 244-251; 270-274.

[499] See T Moe, 'The politics of Structural Choice: Toward a Theory of Public Bureaucracy', in OE Williamson (ed), *Organization Theory: From Chester Barnard to the Present and Beyond* (Oxford University Press 1990) 122-125.

[500] See KA Shepsle, 'Discretion, Institutions and the Problem of Government Commitment' in P Bourdieu and J Coleman, *Social Theory for a Changing Society* (Westview Press 1991) 247; P Pierson, 'Limits of design: Explaining Institutional Origins of Change' (2000) 13 Governance 491.

[501] See Shepsle (n 500) 247.

Members of Congress who supported the adoption of the 1986 Tax Reform Act later went to sponsor other bills that unravelled the Tax Reform Act because 'it was profitable'.[502]

Climate change policies are susceptible to policy reversal due to both political uncertainty/instability and time-inconsistent incentives of political actors. Climate policy reforms such as an emissions trading system (ETS) impose short-term costs for benefits that are diffuse and distant.[503] While the interest groups such as the fossil fuel industry that shoulder the short-run costs can easily organise and lobby against strong climate action, the public – the beneficiary of the policies – is too diffuse to organise and defeat the narrow interest groups. The short time horizon of electoral politics also amplifies the short-run costs of climate change action and discount the long-term benefits of climate change mitigation and consequences of climate change.[504]

Climate policy-making is also apt to ideological diversity with multiple veto players holding diverse policy preferences, which can lead to a vexing problem of cycling.[505] With complex issues such as climate change and multiple preferences

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502 See E Patashnik, 'Making Reforms Sustainable: Lessons from the American Policy Reform Experience' in EA Lindquist, S Vincent and J Wanna, *Delivering Policy Reform: Anchoring Significant Reforms in Turbulent Times*, (Australian National University Press 2011) 29.

503 See for instance, J Hovi, DF Sprinz and A Underdal, 'Implementing Long-Term Climate Policy: Time Inconsistency, Domestic Politics, International Anarchy' (2009) 9 Global Environmental Politics 20; RJ Lazarus, 'Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future' (2009) 94 Cornel Law Review 1153, 1159-1161.

504 P Pierson, *Politics in Time: History, Institutions, and Social Analysis* (Princeton University Press 2004) 41-42; Lazarus (n 503) 1159-1161.

505 The cycling paradox was discovered by Marquis de Condorcet, an eighteenth-century French mathematician and philosopher. For discussions about the cycling paradox, See DA Skeel, 'Public Choice and the Future of Public-Choice-Influenced Legal Scholarship' (1997) 50 Vanderbilt Law Review 647. Kenneth Arrow built upon Condorcet's proposition and showed that it is impossible for any decision rule to aggregate individual preferences into social orderings and, at the same time, satisfy a short list of fairness requirements. For a discussion of Arrow's 'Impossibility Theorem', see EM Penn, 'Impossibility Theorems and Paradoxes in Collective Choice Theory', in JJ Cochran (ed), *The Wiley Encyclopaedia of Operations Research and Management Science* (John Wiley & Sons 2011). Institutions that outline agenda-setting and voting procedures may contain voting behaviour that leads to cycling, leading to 'structure-induced equilibrium'. For a review of the literature about why endless cycling may not happen in real-life policymaking, see KA Shepsle and BR Weingast, 'Why So Much Stability? Majority Voting, Legislative Institutions, and Gordon Tullock' (2012) 152 Public Choice 83.

among voters (multi-peaked preferences), a majority voting rule may lead to a situation whereby no outcome trumps all others, and the result endlessly cycles among the alternative outcomes. If cycling occurs, no policy option trumps all others, making any climate policy initiative inherently unstable. Because the order in which proposals are voted upon affects the outcome, interest groups invest in influencing the rules and institutions governing agenda-setting rather than adapting themselves to the new policy landscape. As Levmore argues, interest groups' activity is expected to be especially potent with the possibility of majority cycles because the probability of success increases with instability.[506]

Both political uncertainty and time-inconsistent incentives of political actors undermine the credibility of a climate policy, increase the risk of policy reversal, discourage long-term investments, and encourage regulated entities to challenge the policy.[507] How, then, is sustaining a climate policy over time possible? The next three subsections discuss, respectively, commitment devices, positive policy feedback, and political polarisation as constraints on policy change.

6.3.1. Commitment devices

Commitment devices foster credibility and design resilience into policies.[508] They constrain a government from reneging on its commitments and encourage other actors to commit to a certain course of action.[509] They come in two forms: institutional constraints and delegation of authority to an independent agency.[510] Institutions such as supermajority voting requirements to pass certain types of amendments can be used to increase political transaction costs and make policy

[506] S Levmore, 'Voting Paradoxes and Interest Groups' (1999) 28 The Journal of Legal Studies 259, 261.

[507] Levmore (n 506); Frye (n 438).

[508] See A Jordan and E Matt, 'Designing Policies that Intentionally Stick: Policy Feedback in a Changing Climate (2014) 47 Policy Sciences 227, 233-234. See also C Hepburn, 'Regulation by Prices, Quantities or Both: A Review of Instrument Choice' (2006) 22 Oxford Review of Economic Policy 226, 234; Lazarus (n 503) 1209.

[509] Designing resilience into a public policy inevitably raises questions about democratic accountability by foreclosing avenues that future lawmakers may use to change a policy. See, for instance, K Cole, 'Genius vs. Zombies: To Address Climate for the Long Haul, Empower the Innovators, but Don't Disinter the "Dead Hand"' (2010) 40 Environmental Law & Policy Annual Review 10757, 10757-10759. Lazarus argues that there are good reasons for doing so. See Lazarus (n 503) 1194-1195.

[510] Shepsle (n 500) 247.

change cumbersome.[511] An institutional constraint could come in the form of shared power among different actors. The involvement of various institutional actors increases political transaction costs and makes policy change cumbersome.[512] North and Weingast argue, for instance, that shared power between the King and Parliament in post-1688 England provided a credible commitment to the protection of property rights.[513] Institutional constraints could also be external to a jurisdiction in the sense that they couple a policy to a country's international commitments and bind a government through an international agreement *vis-à-vis* international actors and institutions.[514]

Political actors may also increase the credibility of a given policy by delegating decision-making or advisory functions to independent institutions.[515] Delegation shifts decision-making/advisory functions from the partisan arena to a technocratic sphere, allowing decisions/recommendations to be taken/made by bureaucrats who may have time-consistent incentives.[516] This enables political actors to '"stack the deck" in favour of their preferred policy outcomes in a bureaucratic decision-making environment that is more durable than the electoral coalition that created it.'[517] In addition, if an independent regulatory agency is established, the agency becomes a political constituency, and its officials become new forces to reckon with whenever the government tries to unravel the relevant policy.[518]

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511 See D North and BR Weingast, 'Constitutions and Commitment: The Evolution of Institutional Governing Public Choice in Seventeenth-Century England' (1989) 49 The Journal of Economic History 803, 818; Shepsle (n 500) 247; Breen and McMenamin (n 438) 848.

512 Breen and McMenamin (n 438) 848.

513 North and Weingast (n 511) 818.

514 T Ginsburg, 'Locking in Democracy: Constitutions, Commitment, and International Law' (2006) 38 International Law and Politics 707, 727; Brunner, Flachsland and Marschinski (n 437) 256-257; Lazarus (n 503) 1209. See also PF Stienberg, 'Welcome to the Jungle: Policy Theory and Political Instability' in PF Steinberg and SD Vandeveer (eds), *Comparative Environmental Politics* (The MIT Press 2012) 273. Steinberg argues that establishing 'meaningful linkages outside the … [climate] policy subsystem' helps in sustaining the climate policy reform by spreading regulatory responsibilities and building constituencies across different government departments and levels of government.

515 DJ Levinson, 'Parchment and Politics: The Positive Puzzle of Constitutional Commitment' (2011) 124 Harvard Law Review 657, 679-680; Brunner, Flachsland and Marschinski (n 437) 263-264.

516 Moe (n 499) 125. See also Breen and McMenamin (n 438) 843-844.

517 Levinson (n 515) 679.

518 One of the fundamental insights of Public Choice is that bureaucrats are self-interested individuals that are in pursuit of maximising their utility (whether it is income, power, prestige or something else). See G Tullock, A Seldon and GL Brady, *Government Failure: A Primer in Public Choice* (Cato Institute 2002) 15.

The creation of an independent central bank constitutes a classic example of delegation of decision-making authority. By establishing an independent central bank, political actors forgo pursuing economic policies for short-run economic gains and 'shut out their opponents by shutting themselves out too.'[519] The establishment of the UK's Committee on Climate Change (CCC) , which is tasked with advising the UK government on emissions reduction targets, has been presented as an example enhancing the credibility of a climate policy through the delegation of advisory and monitoring functions to an independent agency.[520]. In sum, political actors bind themselves and their successors by removing 'certain options from their future menu',[521] and help a (climate) policy 'survive and prosper in an uncertain political future'.[522]

While designing commitment devices into a policy increases resilience, it may lead to inflexibility. A climate policy that is 'frozen in time' lacks credibility because it constrains policymakers from making adjustments in response to new information in climate science and technology and exogenous shifts in the economy.[523] A policy could balance durability and flexibility by including monitoring and review systems, allowing periodic assessment and adjustment of the policy.[524] A policy may also include procedural rules that establish the conditions under which it may be revisited to take into account changing circumstances.[525] In climate policy, this may, for instance, take the form of coupling the revision of the policy to international climate-related commitments of the relevant country.

6.3.2. Positive policy feedback

Institutions alone are unlikely to protect a policy from unravelling. While generally more durable than policies, institutions are themselves outcomes of political compromises and could be undone by opposing forces. As Patashnik puts it, a

[519] See Moe (n 499) 125.

[520] Climate Change Act 2008 (UK), s 32(1); Brunner, Flachsland and Marschinski (n 437) 263-264; M Lockwood, 'The Political Sustainability of Climate Policy: The Case of the UK Climate Change Act' (2013) 23 Global Environmental Change 1339, 1343; Keenan and others (n 435) 477.

[521] P Pierson, 'Increasing Returns, Path Dependence, and the Study of Politics' (2000) 94 American Political Science Review 251, 262. See also Pierson, 'Limits of design' (n 500) 491.

[522] Moe (n 499) 124.

[523] See Jordan and Matt (n 508). See also Hepburn (n 508) 234; Lazarus (n 503) 1209.

[524] See Jordan and Matt (n 508).

[525] See Jordan and Matt (n 508).

policy's political sustainability hinges on 'the reactions, expectations, and behavioural change' it generates over time.[526]

Because climate policy reforms impose short-term costs on concentrated interest groups, it is expected that they generate negative policy feedback from regulated entities. The public – the beneficiary of the climate policy reforms – is too diffuse to organise and fight back attempts to unravel the policies. The positive policy feedback needs to come from organised interest groups. A positive policy feedback cannot, however, be left to chance. It needs to be actively generated through skilful policy design choices. Some of the mechanisms of generating positive policy feedback and neutralising negative feedback include organising and empowering constituencies that have a stake in the durability of the reform, disempowering interest groups that oppose the reform, and changing the cognitive mind-set of narrow interest groups by persuading them that they have more to gain by adapting than continuing to fight.[527]

Cap-and-trade systems, for instance, create new constituency groups in the finance and banking sector with a stake in the continuation of the systems. Once new constituencies are created, 'old' market forces, faced with the new reality, will have to adapt by adopting new agendas and strategies lest they will lose market share.[528] Instruments that require groups opposed to a policy bear short-term costs by, for instance, making upfront investments, may help in turning them to become 'clienteles with a strong stake in the policies continuation.'[529] Defining long-term targets also shapes private actors' expectations and encourages them to commit to a policy by making long-term investments, creating sunk costs.

These induce a cycle of positive feedback whereby a policy becomes self-sustaining. With the positive feedback getting momentum and accumulating over time, a policy entrenches itself, creating path dependence. Path dependence increases 'the costs of exit – of switching to some previously plausible alternative',[530]

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[526] E Patashnik, *Reforms at Risk: What Happens after Major Policy Changes are Enacted* (Princeton University Press 2008) 29.

[527] Patashnik, *Reforms at Risk* (n 526) 29; Stienberg (n 514) 273; Levinson (n 515) 687.

[528] P Pierson, 'The Study of Policy Development' (2005) 17 Journal of Policy History 34, 45; Patashnik, *Reforms at Risk* (n 526) 28.

[529] Jordan and Matt (n 508) 235.

[530] Pierson, 'Increasing returns' (n 521) 252.

'limits the design space',[531] and entrenches a policy, making its reversal 'all but unthinkable'.[532]

6.3.3. Political polarisation and commitment devices

Whether institutional constraints and delegation of decision-making authority, in fact, enhance credibility depends, in addition to their design, on the political conditions under which they operate. Keefer and Stasavage find evidence that high political polarisation among veto players increases the discretion a central bank enjoys to determine monetary policy, thereby enhancing its credibility.[533] Frye, on the other hand, found a correlation between high political polarisation and a decline in faith private actors attach to economic policies.[534] Breen and McMenamin, analysing the credibility of sovereign debtors in advanced economies, found a correlation between low political polarisation and high credibility of sovereign debtors in advanced economies.[535] Although the outcomes of these studies are mixed, they suggest that political polarisation affects the success of commitment devices as mechanisms of fostering credibility.[536]

Political polarisation is studied extensively within the veto players literature pioneered by George Tsebelis.[537] The literature examines policy stability along three of veto players' attributes: their number, congruence (political polarisation in a relevant

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531 M Howlett, 'From the "Old" to the "New" Policy Design: Design Thinking Beyond Markets and Collaborative Governance' (2014) 47 Policy Sciences 187 as cited in Jordan and Matt (n 508) 232.

532 Patashnik, *Reforms at Risk* (n 526) 25-26. It is also plausible that the opposite could happen. A policy's positive feedback may be dampened by negative policy feedback especially when the policy imposes costs on concentrated groups (as in climate policy). See RK Weaver, 'Paths and Forks or Chutes and Ladders? Negative Feedbacks and Policy Regime Change' (2010) 30 Journal of Public Policy 137; Jordan and Matt (n 508) 232. Positive policy feedback may also be dampened or blocked due, for instance, to weak design, poor timing, and inadequate or conflicting institutional support. E Patashnik and JE Zelizer, 'When Policy does not Remake Politics: The Limits of Policy Feedback' (Presented at the Republic of Statutes Conference, Yale Law School, December 2010) 3.

533 Keefer and Stasavage (n 438) 420-421.

534 See, for instance, Frye (n 438).

535 See, for instance, Breen and McMenamin (n 438) 851.

536 For a review of the literature, see M Hallerberg, 'Empirical Application of Veto Payer Analysis and Institutional Effectiveness' in T Konig, G Tsebelis and M Debus (eds), *Reform Processes and Policy Change: Veto Players and Decision-Making in Modern Democracies* (Springer 2010) 36-39.

537 See generally G Tsebelis, 'Decision Making in Political Systems: Veto Players in Presidentialism, Parliamentarism, Multicameralism and Multipartyism' (1995) 25 British Journal of Political Science 289; Tsebelis, *Veto Players* (n 428).

policy direction), and cohesion (the unity of each veto player in an issue area).[538] Assuming that veto players are cohesive, policy stability increases with an increase in the number and political polarisation of veto players. Political polarisation gauges the degree to which veto players hold dissimilar policy preferences over an issue. Because a significant change to policy needs to be agreed by all the veto players, policy change becomes more difficult (*i.e.*, policy stability increases) the higher the number of the veto players and the greater the political polarisation among them.[539] With ideological polarisation among them, the veto players will find it difficult to agree on an alternative to the *status quo.* Stated otherwise, the composition of the government (involving, for instance, multiple veto players with different policy preferences) serves as a commitment mechanism and enables 'political actors credibly to commit that there will be no significant policy changes.'[540]

Because durability by definition implies inter-temporal stability, political polarisation among successive governments is also critical in assessing policy sustainability and the credibility economic actors attach to a given policy. The political polarisation between successive governments (known in the literature as 'alternation') affects policy stability in that a government that is much different from its predecessor is likely to significantly depart from the *status quo* by unravelling the policies of the previous government and introducing its own. Hence the lower/higher the ideological distance between the successive governments, the higher/lesser the probability that the *status quo* will remain stable.[541]

6.4. Explaining policy durability

This Section applies the theoretical insights developed in Section 6.3 to explain the durability of the EU ETS and the unravelling of the Australian CPM.

6.4.1. Commitment devices and policy durability

This Section identifies design elements of the Australian CPM and the EU ETS and analyses whether they might explain the durability of the former and the unravelling of the latter.

[538] Tsebelis, 'Decision Making in Political Systems' (n 537) 301.

[539] G Tsebelis, 'Veto Players and Law Production in Parliamentary Democracies: An Empirical Analysis' (1999) 93 American Political Science Review 591, 594-596.

[540] Tsebelis, 'Veto Players and Law Production' (n 539) 604.

[541] Tsebelis, 'Veto Players and Law Production' (n 539) 596; Hallerberg (n 536) 23.

(a) Commitment devices: Australian CPM

The Australian CPM was designed to counter possible attempts to reverse it. This objective was reflected in the design features of the CPM and other policy packages that sought to make the CPM resilient to political uncertainty, buy off businesses opposed to the CPM, and broaden its support base by building new constituencies. The policy packages that aimed at creating new constituencies and reconfiguring the interests of the CPM's adversaries are discussed in the next Section. This Section focuses on institutional features that aimed at designing resilience and flexibility into the CPM.

The first concerns the establishment of the CCA, which is modelled to a large extent after the UK's CCC.[542] The CCA is a statutory body initially set up to, *inter alia*, advise the Australian government on the CPM's caps and Australia's long-term emissions reduction targets and to periodically review the performance of the CPM.[543] It is composed of nine members – a chair, the chief scientist and seven other expert members – appointed by (except the chief scientist) the Climate Change Minister.[544] The enabling statute of the CCA includes measures to safeguard the CCA's independence and impartiality. For instance, members of the CCA could be dismissed only on a limited number of grounds such as physical or mental incapacity and bankruptcy.[545]

In addition, although the Climate Change Minister is allowed to 'give directions' to the CCA, the instructions 'must be of a general nature only'.[546] In particular, the Climate Change Minister is prohibited from giving directions that 'relate to the conduct of a particular review or the content of a report of a particular review'.[547] Once the CCA files a report of its review, the Climate Change Minister is required to table the report in each House of the Parliament 'within 15 sitting days of that

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542 Keenan and others (n 435) 477.

543 Commonwealth of Australia, *Securing a Clean Energy Future: The Australian Government's Climate Change Plan* (Australian Government 2011) 110-111. After the Coalition-led government abolished the CPM in 2014, the powers and functions of the CCA as they relate to the CPM have been repealed. See *Climate Change Authority Act 2011 (No 143) 2011* (Cth), ss 10-13 (hereafter: Climate Change Authority Act).

544 Climate Change Authority Act, ss 17-18.

545 Climate Change Authority Act, s 75.

546 Climate Change Authority Act, s 57(2).

547 Climate Change Authority Act, s 57(3).

House after receiving the report.'[548] If the report specifies recommendations, the Climate Change Minister must prepare a statement setting out the government's response to each of the recommendations.[549] These measures ensure public scrutiny of the government's response to the CCA's reviews and recommendations.

The second institutional feature concerns a rolling system of setting the CPM's cap. The CPM's cap was set on a rolling basis in that it was initially set for five years and extended annually for another year through a regulation tabled in parliament.[550] Ideally, the Climate Change Minister tables a proposed pollution caps for the first five years of the CPM's flexible-prices period (2015-2020).[551] Afterwards, the Minister tables a regulation every year to extend the cap fixed for the first five years by one year.[552] If the regulation setting out the cap is defeated in either of the Houses of the Parliament or if the Minister fails to table the regulation, a default cap that is defined in the Clean Energy Act shall be applicable.[553]

Keenan and others argue that the CCA 'provides some assurance that caps and emissions-reduction targets will be informed by the latest science and have scientific integrity.'[554] Similarly, Caripis and others argue that the establishment of the CCA 'engenders some confidence in the scope for improvement of the [CPM] … as Australia embarks on a journey of "learning while doing".'[555] Egenhofer and others contend that the rolling system of cap-setting instilled flexibility into Australian climate policy as it provided an opportunity to adjust the cap in response to changing circumstances.[556] Caripis and others further observed that it could 'guard against a

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548 Climate Change Authority Act, s 60(2).

549 Climate Change Authority Act, s 60(7/a).

550 Caripis and others (n 433) 590.

551 Clean Energy Act 2011 (No. 131) 2011 (Cth), s 16 (hereafter: Clean Energy Act).

552 Clean Energy Act, s 16(5). See also Explanatory Memorandum, Clean Energy Bill 2011 (Cth), ch 2.16 (hereafter: Explanatory Memorandum); Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) 103.

553 The default cap for the financial year of the first flexible charge period was set at 38 Mt less than total emissions of liable entities for the year beginning 1 July 2012, and 12 Mt below emissions of the previous year for every year thereafter. Clean Energy Act, ss 17-18. See also Caripis and others (n 433) 590.

554 Keenan and others (n 435) 477.

555 Caripis and others (n 433) 588. For a similar assessment, see Keenan and others (n 435).

556 C Egenhofer, A Marcu and A Georgiev, 'Reviewing the EU ETS Review' (2012) 18-19, Centre for European Studies (CEPS) <https://www.ceps.eu/publications/reviewing-eu-ets-review> accessed 9 December 2015.

future government seeking to “loosen” or undermine the cap’.[557] In this sense, while the establishment of the CCA was seen as a mechanism of fostering credibility to by instilling both predictability and flexibility to Australia’s climate policy in general and the CPM in particular, the rolling system of cap-setting (coupled with the default cap) was seen as a system of designing resilience and flexibility into the CPM.

Seen against the backdrop of Australian polarised climate politics, it is doubtful whether the CCA would cultivate ‘confidence in the scope for improvement of the [CPM]’[558] or that the system of cap-setting would ‘guard against a future government seeking to “loosen” or undermine the [CPM’s] cap.’[559] To be sure, as discussed before, the UK’s CCC, after which the CCA was modelled, has been credited with lending credibility to the UK’s climate policy.[560] However, the UK’s climate change politics has been much less partisan than that of Australia, with the three major parties extending cross-party support to the country’s climate policy.[561] The cross-party support naturally creates a favourable political condition for the acceptance of the CCC’s recommendations. The same cannot be said about CCA’s recommendations. The highly partisan nature of Australian climate politics creates doubts if the recommendations and reviews by the CCA would be accepted.

If one casts doubt on the credibility-enhancing potential of the CCA, it is also uncertain whether the system of cap-setting could curtail *ex post* government opportunism. The argument that the system of cap-setting could ‘guard against a future government seeking to “loosen” or undermine the cap’[562] rests on faith in the default cap. To be sure, if the CPM’s cap cannot be extended, the default cap will be triggered and serve as a backup. However, adjusting the trajectory of the

[557] Caripis and others (n 433) 590.

[558] Caripis and others (n 433) 588.

[559] Caripis and others (n 433) 590.

[560] Brunner, Flachsland and Marschinski (n 437) 263-264; Lockwood (n 520) 1343; Keenan and others (n 435) 477.

[561] For instance, in the lead up to the 2015 general election, leaders of the three major parties – David Cameron (the Conservative), Ed Miliband (Labour) and Nick Clegg (Liberal Democrats), signed a cross-party pledge characterising climate change as ‘a threat … to our national and global security, to poverty eradication and economic prosperity.’ See D Carrington, ‘Cameron, Clegg and Miliband sign joint climate pledge’ *The Guardian* (London, 14 February 2015) <https://www.theguardian.com/environment/2015/feb/14/cameron-clegg-and-miliband-sign-joint-climate-pledge> accessed 18 November 2016.

[562] Caripis and others (n 575) 588.

default cap set in the Clean Energy Act requires parliamentary assent. Without a regulation by the Parliament, the default cap would lock-in an inflexible cap. An inflexible cap lacks credibility precisely because it cannot be adjusted in response to changing circumstances. Worse, a government could undermine or loosen the cap without triggering the default cap. If a government sets a less stringent cap than the default, the default cap will not be triggered as this constitutes neither failure to table a regulation extending the cap nor a rejection of the proposed regulation by Parliament.[563]

(b) Commitment devices: EU ETS

In stark contrast to the CPM, not only has the EU ETS lacked the types of adhesion and flexibility mechanisms, but it has also been beset by several challenges that could potentially threaten its sustainability. In Phase I (2005-2008), it faced a problem of allowance over-allocation, leading to allowance prices to crash from near €30/ tCO_2 to around €13.35/tCO_2 in April 2006 and gradually to near zero.[564] Since the 2007/08 financial crisis, the EU ETS has been facing a supply glut that resulted in over 2 billion excess allowances. The oversupply, expected to outlast the second phase (2013-2020), depressed allowance prices and stifled much-needed low-carbon long-term investments.

However, these post-enactment challenges do not seem to threaten the durability of the EU ETS. For instance, during the April 2006 price crash, the market valued dirtier firms less than cleaner firms, which could be indicative of investors' confidence in the inter-temporal stability of the ETS.[565] It seems that the relatively low political polarisation over climate policy has allowed the EU to credibly commit that the EU ETS will be politically sustainable. In addition, the complex institutional architecture of the EU makes policy change naturally cumbersome. This is even more so because

563 It could be argued that because Australia's emissions target of 5 per cent below 2000 levels by 2020 enjoys a bi-partisan support, the CCA's recommendations about the level of the CPM's cap might too enjoy bi-partisan support. However, the bi-partisan support for the overall emissions reduction target does not necessarily translate into support for the CPM's cap because of divisions between the Coalition and Labor over the mechanisms of achieving the target. Given its opposition to the CPM, it is to be expected that the Coalition might try to undermine the CPM by, for instance, rejecting a regulation extending the cap.

564 DA Ellerman and BK Buchner, 'Over-Allocation or Abatement? A Preliminary Analysis of the EU ETS based on the 2005-06 Emissions Data' (2008) 41 Environmental Resource Economics 267, 285.

565 See Jong, Couwenberg and Woerdman (n 430).

agenda-setting is controlled by the Commission, which, as discussed above, used climate policy as an instrument of furthering the European integration agenda. This limits the probability that sweeping changes unravelling the current climate policy will be proposed and adopted.

The post-enactment challenges, far from undermining the durability of the EU ETS, have instead been used as launching pads for reforming the ETS. The problem of over-allocation in Phase I (2005-2007), attributable partly to the decentralised nature of cap-setting and a lack of accurate emissions data, led to significant changes in the EU ETS' architecture for the third phase (2013-2020).[566] Allowance allocation and cap-setting have been centralised at the EU level.[567] The EU-wide cap has been set by the Commission and has been decreasing annually in a linear fashion by 1.74 per cent from 2013.[568] Allowances have been allocated based on EU-wide harmonised rules and auctioning has been made the default mode of allocation.[569] Introducing auctioning as a dominant mode of allowance allocation also addressed the issue of windfall profits, which arose in the initial phase of the ETS because energy firms were passing on the costs of carbon to consumers despite receiving almost all allowances free of charge.[570] The problem of oversupply has similarly kick-started a reform process to make the EU ETS resilient to demand-side shocks and has resulted in the establishment of the Market Stability Reserve.[571]

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566 Ellerman, Convery and de Perthuis (n 477) 36-41. See also Ellerman and Buchner (n 564) 285.

567 See Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the community [2009] OJ L140/63, arts 9-10 (hereafter: Revised Emissions Trading Directive).

568 Revised Emissions Trading Directive, art 9.

569 See Revised Emissions Trading Directive, arts 10 and 10a. Although the scheme continued with its decentralised system of allocation and cap-setting during Phase II (2008-2012), the lessons from the first phase led the Commission to follow a strict approach in approving NAPs for the second phase (2008-2012). Phase II allocations were cut 5.9 per cent below 2005 verified emissions. Ellerman, Convery and de Perthuis (n 477) 80.

570 See generally Woerdman, Couwenberg and Nentjes (n 431).

571 Decision (EU) 2015/1814 of the European Parliament and of the Council concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC [2015] OJ L264/1. See also Commission, 'The state of the European carbon market in 2012' COM (2012) 652 final; Commission, 'A policy framework for climate and energy in the period from 2020 to 2030' (Communication) COM (2014) 15 final.

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It should be noted that while the complex institutional architecture of the EU helps to protect the EU ETS from unravelling, it has created challenges for reforming it.[572] This has been made worse by the 2007/08 financial crisis that revived carbon leakage and competitiveness concerns. Although the EU institutions have had differences over the EU ETS since the ETS's inception, the financial crisis has 'made conflicts deeper and harsher, pushing climate change down the political agenda.'[573] While frontrunner Member States such as the UK advocate for structural changes to rescue the ailing EU ETS, several other Member States such as Poland have resisted reform options leading to higher carbon prices.[574] With signs of political polarisation over climate policy emerging in the EU, the very structure that has made the EU ETS durable is harming its credibility by making it too inflexible for its own good.

6.4.2. Positive policy feedback and policy durability

A climate policy fares a better chance of prospering in an uncertain future if it sets off a cycle of positive feedback, creating path dependence, entrenching itself and making policy reversal costly. However, a cycle of self-reinforcing positive feedback is not automatic. It has to be actively generated through, *inter alia*, long-term investment schemes and mechanisms of building new constituencies and reconfiguring interests of climate policy adversaries.

(a) Policy feedback: Australian CPM

The announcement of the Australian CPM had been hugely unpopular among voters, businesses – especially the fossil fuel industry – and the then-in-opposition party, the Coalition. The fossil fuel industry attacked the carbon policy as hurting competitiveness by imposing a high carbon price before Australia's major competitors started pricing carbon.[575] The negative policy feedback persisted despite the several assistance and compensation schemes introduced as part the Clean Energy Act. In the following, we discuss these schemes and explain why they failed to generate positive policy feedback or turn adversaries of the CPM into its clienteles.

572 See generally J Wettestad, 'Rescuing EU Emissions Trading: Mission Impossible?' (2014) 14 Global Environmental Politics 64.

573 Wettestad (n 572) 75.

574 Wettestad (n 572) 74-76.

575 'Australia's carbon-tax drama' (n 462) 1-4.

The Australian CPM was designed with instruments that could, at least in theory, create positive policy feedback. First, it was designed as a hybrid ETS, combining features of tax and emissions trading. It had a three-year fixed-price period before transitioning to flexible prices in 2015.[576] Even during the initial years of the flexible price period, prices were not to become fully flexible as the CPM had a price floor and a price ceiling from 2015 to 2018.[577] The hybrid nature of the CPM and its price corridors were designed to provide price certainty and promote long-term investments, building new constituencies whose benefits hinge on the sustainability of the CPM and creating sunk costs that could increase the costs of unravelling the CPM.

Second, the CPM included assistance schemes that aimed at easing the carbon price burden on businesses and households and helping businesses transition to a low-carbon future. Emissions-intensive trade-exposed sectors received varying levels of allowances free of charge through a Jobs and Competitiveness Program.[578] Households received assistance through tax cuts, higher family payments, and increases in pensions and allowances. A Clean Technology Program, consisting of A$1.2 billion over seven years, was included to assist manufacturing industries in implementing energy-efficient technologies.[579] These assistance and compensation schemes could be characterised as mechanisms of building new constituencies and reconfiguring the interests of the CPM's adversaries.

Third, an Energy Security Fund was set up with the stated aim of transforming Australia's highly emissions-intensive energy sector through a 'payment for closure' scheme and a transitional assistance scheme for electricity generators.[580] The 'payment for closure' scheme, which planned to close 2000 megawatts of electricity generation capacity by 2020, was to start a process of replacing highly emissions-intensive power generators with cleaner forms of energy production.[581] The provisional assistance, consisting of A$5.5 billion, was designed to 'help generators that face sizeable asset

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[576] Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) 107.

[577] Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) 27.

[578] Clean Energy Amendment Regulation 2012 (No.1) 2012 (Cth) (hereafter: Clean Energy Amendment Regulation).

[579] Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) 37-38; 56; 71-76.

[580] Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) 71-76.

[581] Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) 75.

value losses under a carbon price.'[582] By closing down 2000 megawatts of electricity generation capacity and replacing it with cleaner forms of energy production, the government could 'force' the power sector to shoulder short-term costs and turn them from adversaries of the CPM into its advocates.

Neither of the instruments that was meant to generate positive policy feedback and to dampen negative feedback was able to achieve its purpose. The explanation to this might lie in understanding firm's investment behaviour under uncertainty. Dixit argues that the value of deferring investment increases if three conditions are met.

> First, almost as a matter of definition, an investment entails some sunk cost, an expenditure that cannot be recouped if the action is reversed at a later date. Second, the economic environment has ongoing uncertainty, and information arrives gradually. Finally, an investment opportunity does not generally disappear if not taken immediately; the decision is not only whether to invest, but also when to invest. [...] When these three conditions are present, waiting has positive value. In the evolving environment, time brings more information about the future prospects of the project. As long as the opportunity to invest remains available, a later decision can be a better one. And because there are sunk costs, it does not always pay to take a less perfect action now and change it later.[583]

Dixit's three conditions were met in the Australian context.[584] First, the investments that the CPM needed (and attempted) to spur for it to be too costly to reverse are low-carbon long-term investments that create sunk costs. Second, the CPM's lack of bi-partisan support had created 'ongoing uncertainty' about the credibility of the CPM's long-term carbon price signal. Investors were better off waiting until at least the (then upcoming) 2013 federal election cycle passed. Third, failure to invest during the early years of the CPM did not entail forgoing investment

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582 Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) 74.

583 A Dixit, 'Investment and Hysteresis' (1992) 6 The Journal of Economic Perspectives 107, 108. See also AK Dixit and RS Pindyck, *Investment under Uncertainty* (Princeton University Press 1994) 8-9.

584 See F Jotzo, T Jordan and N Fabian, 'Policy Uncertainty about Australia's Carbon Price: Expert Survey Results and Implications for Investment' (2012) 45 The Australian Economic Review 395, 403-405.

opportunities in the future. The result was that schemes designed to spur long-term investments and create sunk costs that could increase the costs of reversing the CPM did not function as planned. This could be illustrated by the failure of the 'payment for closure' programme – the government's flagship scheme that aimed at creating space for low-carbon energy investments by closing down (for compensation) some of the most polluting coal-fired power plants.

The 'payment for closure´ programme was abandoned in September 2012 because the government and electricity generators failed to agree on a price for the closure of five coal-fired power plants.[585] It is straightforward to see why the power generators and the government were unable to agree on the level of compensation.[586] For the power operators, the increasing popularity of the Coalition, whose leader made '"a pledge in blood" to repeal the carbon tax as the "first order of business"' if he won the 2013 federal election,[587] significantly increased the risk of the CPM's reversal, leading them to value the costs of closing down as high. For the government, which was expecting that the CPM would survive the 2013 election, the costs of keeping coal-fired power plants up and running were high.

The uncertainty created by the highly partisan climate politics also curtailed the potential of the other compensation, funding, and investment schemes in creating new policy clienteles, locking in long-term investments, and reconfiguring the interest of the CPM's adversaries. Because of the CPM's lack of cross-party support, businesses had more to gain in the long-run by fighting back and thwarting a costly climate policy than becoming policy clienteles by succumbing to the transitional assistance and funding schemes. Stated differently, the polarised climate politics gave businesses significant scope to resist carbon pricing.

The upshot of this is that policy designs that could in theory help entrench a policy be increasing the costs of exit may require favourable political conditions to thrive.

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585 See Point Carbon, 'Australia Scraps Dirty Power Station Closure Plan' *Thompson Reuters* (Oslo, 28 September 2012) <http://www.pointcarbon.com/polopoly_fs/1.2002298!CMANZ20120928.pdf> accessed 11 February 2014.

586 Another plausible explanation lies in the effect of the 2012 Australia-EU agreement to link their respective carbon markets starting in 2015. See the discussion in Section 6.4.3 below.

587 Burgmann and Baer (n 441) 84.

(b) Policy feedback: EU ETS

In contrast to businesses in Australia, businesses in the EU largely rallied behind the EU ETS. A pro-ETS business coalition led by the British Petroleum, Shell and other businesses in the electricity sector played a significant role in the acceptance of emissions trading.[588] To be sure, businesses' support for the EU ETS was far from unified. Some firms, notably the German industry and emissions-intensive sectors, mounted fierce opposition to the proposed EU ETS, preferring voluntary climate policy instruments.[589] They were, however, overwhelmed by the pro-ETS business coalition.[590] Understanding businesses' positive feedback in response to the EU ETS requires understanding the politics behind the carbon tax proposal of the 1990s that both several Member States and businesses fiercely opposed and thwarted.

Member States' opposition to the tax was rooted, not in pricing carbon *per se*, but in jealously guarding their national prerogatives over taxation. Several Member States opposed the carbon tax because they thought taxation as 'a core value not to be relinquished even if the environment would benefit.'[591] The botched carbon tax, contrary to showing deep divisions among the Member States over the issue of pricing carbon, signalled that another form of climate regulation was inevitable, arguably paving the way for a favourable reception of the emissions trading proposal by businesses.

The relatively low political polarisation over pricing carbon naturally leaves limited space for industry to mount significant opposition against the pricing of carbon altogether. Faced with an impeding climate regulation, businesses rallied behind the proposed EU ETS as a strategy of pre-empting a costlier climate policy.[592] Instead of opposing emissions trading altogether, they lobbied for the 'spoils' of the ETS, leading to a generous allocation of allowances during Phase I (2005-2007) of the EU ETS.[593] The broad-based support for the EU ETS during its formative years helped cement the EU ETS to take root during its early phase.

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588 Meckling (n 477) 111-114.

589 Meckling (n 477) 118-122.

590 Schreurs and Tiberghien (n 471) 32-33; Meckling (n 477) 108-122.

591 Ellerman, Convery and de Perthuis (n 477) 16.

592 Schreurs and Tiberghien (n 471) 32-33; Meckling (n 477) 108-122; Skjærseth and Wettestad (n 474) 75.

593 E Woerdman, 'The EU Greenhouse Gas Emissions Trading Scheme' in E Woerdman, MM Roggenkamp and M Holwerda (eds), *Essential EU Climate Law* (Edward Elgar 2015) 43-75.

The EU ETS has, however, failed to deliver sufficiently high and predictable prices to incentivise low-carbon investments that hinge on its sustainability. Allowance prices have been too low and too unpredictable to incentivise long-term investments and innovations in low-carbon technologies.[594] Despite this, support for the EU ETS has not waned enough to cause its unravelling. While some stakeholders (notably the power sector, NGOs, and non-energy intensive industries) favour high carbon prices, others (mostly emissions-intensive industries) maintained that the low carbon price shows simply that little abatement is needed to meet the ETS' target.[595] In addition, the emergence of the EU ETS created powerful new constituencies such as banks, accounting and law firms that created a new financial market and benefit from the new regulation.[596] Even with low carbon prices, these sectors are likely to continue supporting the EU ETS as they have a stake in its durability.

6.4.3. Linking ETSs as an institutional constraint

As indicated in Section 6.3.1, institutional constraints may also be external to a given jurisdiction.[597] External institutional constraints may decrease the risk of policy reversal by tying a policy to the country's international commitments. Linking ETSs can be seen as an external constraint for it embeds a domestic ETS in international climate policy architecture. Brunner and others argue that linking ETSs 'could provide (…) [a] source of external commitment because linking agreements can curtail the flexibility for unilateral adjustments to carbon pricing.'[598]

Even if international law lacks effective enforcement and sanctioning mechanisms,[599] its violation generally imposes costs in the form of retaliatory measures by other parties, reputational sanctions that affect a state's ability to extract concessions in the future, or financial and material sanctions.[600] The costs of violation are affected by several variables including the legal nature of the agreement

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594 See generally Weishaar, 'Incentivising Technologic Change' (n 432).

595 See Commission, 'Options for Structural Measures to Strengthen the EU Emissions Trading System: Main Outcomes of the Public Consultation' (2012) 4-5, <http://ec.europa.eu/clima/consultations/docs/0017/main_outcomes_en.pdf> accessed on 05/09/2014.

596 Meckling (n 477) 189.

597 See text to note 514 above.

598 Brunner, Flachsland and Marschinski (n 437) 268 (reference omitted).

599 See generally A Cassese, I*nternational Law* (2nd edn, Oxford University Press 2015) 278-313.

600 Ginsburg (n 514) 730-731; TL Meyer, Power, Exit Costs, and Renegotiation in International Law' (2010) 51 Harvard International Law Journal 379, 393-394.

and its design.[601] Crudely, hard law agreements such as treaties impose a higher cost of exit than their soft law counterparts.[602] In terms of design, reservation clauses, amendment and revision provisions, and rules governing suspension, withdrawal and termination lower the costs of exit by allowing flexibility with respect to revision of and withdrawal from an international agreement.[603] By contrast, provisions that stipulate mandatory dispute settlement and monitoring and enforcement mechanisms increase the costs of exit.[604]

The 2012 Australia-EU interim deal to link the Australian CPM and the EU ETS from 2015 could be seen as an external commitment device that could potentially increase the costs of abolishing the CPM for any future government. However, we cannot assess why the deal failed to protect the CPM from unravelling because the linking negotiation was never completed.[605] Australia's Labor-led government, which introduced the CPM and was negotiating with the EU on the linking, lost the 2013 federal election to the Coalition that finally saw the CPM repealed. Yet the consequences of the Australia-EU link might serve as a cautionary tale about the tradeoffs that linking ETSs entails.

The Australian CPM was designed to not only help Australia achieve its short- and long-run emissions reduction targets, but also to provide a powerful incentive for low-carbon investments and innovation.[606] These objectives informed many of the CPM's design features including a three-year fixed price period, a price floor

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[601] AT Guzman, 'The Design of International Agreements' (2005) 16 The European Journal of International Law 579; Ginsburg (n 514); Meyer (600).

[602] Meyer (600) 395-396.

[603] Meyer (600) 394-396; LR Helfer, 'Flexibility in International Agreements' in JL Dunoff and MA Pollack (eds), *Interdisciplinary Perspectives on International Law and International Relations: The State of the Art* (Cambridge University Press 2011).

[604] Guzman (n 578).

[605] See B Görlach, MA Mehling and E Roberts, 'Designing Institutions, Structures and Mechanisms to Facilitate the Linking of Emissions Trading Schemes' (German Emissions Trading Authority 2015) 77.

[606] The Clean Energy Act, which established the CPM, aimed, *inter alia,* 'to put a price on greenhouse gas emissions in a way that encourages investment in clean energy, supports jobs and competitiveness in the economy, and supports Australia's economic growth while reducing pollution.' See Clean Energy Act, art 3(4). The Australian government expected the carbon price to 'play a major role, creating powerful commercial incentives to avoid traditional high-pollution solutions and to adopt low-pollution alternatives.' See Commonwealth of Australia, *Securing a Clean Energy Future* (n 543) xvi.

and a price ceiling, and a flexible system of cap-setting. The CPM's predictable price signal was, however, undermined by its linking with the EU ETS. Following the announcement of the CPM-EU ETS link, the expected price of Australian Carbon Units – the CPM's carbon 'currency' – for 2015 from fell from A$29 to just A$12.1, wiping out A$6 billion from the government's expected earnings from selling allowances, improving the investment and operational outlook of coal-fired power plants, and slowing down a shift to cleaner energy sources.[607] The price fall was large because, first, Australia had to scrap the CPM's price floor as part of the linking arrangement and, second, the linking exposed the CPM to the EU ETS's oversupply problem that has kept EUA prices very low since 2008/09.

To be sure, the linking of the CPM and the EU ETS could have brought economic and political benefits to both Australia and the EU. For Australia, in addition to embedding the CPM in a bottom-up international climate policy architecture, thereby providing an additional layer of protection against attempts to unravel the CPM, the link would have created access to a carbon market with cheap emissions allowances, neutralising a central criticism against the CPM that its carbon prices are too high relative to other jurisdictions.[608] For the EU, the link would have created an additional, albeit small, demand for European Union Allowances (EUAs), propping up EU ETS's carbon price signal. Politically, it could serve as a stepping stone towards greater international cooperation in climate change policy.

In agreeing to link the CPM to the EU ETS, the Australian government traded off the CPM's relatively high and predictable price signal for short-term economic and political gains. The significant fall in the CPM's carbon prices following the

607 Point Carbon, 'Australia Takes A$6 Billion Write-down after EU CO2 Price Fall' *Thompson Reuters* (Oslo, 24 May 2013) <http://www.pointcarbon.com/polopoly_fs/1.2386086!cmanz20130524.pdf> accessed 11 February 2014. Bourke noted that the price crash changed the investment and operational outlook of coal-fired power plants, slowing down a shift from coal to cleaner energy sources such as gas. See P Bourke, 'Australia-EU ETS Linkage to Slow Shift to Gas-Fired Generation' *Thompson Reuters* (Oslo, 26 October 2012) <http://www.pointcarbon.com/polopoly_fs/1.2035446!CMANZ20121026.pdf> accessed 11 February 2014. See also Point Carbon, 'Australia Offset Scheme Hits Milestone but Future Uncertain' *Thompson Reuters* (Oslo, 13 December 2013) <http://www.pointcarbon.com/polopoly_fs/1.3366648!CMANZ20131213.pdf> accessed 11 February 2014.

608 Greg Combet – then Climate Change Minister – emphasised that the linking 'provide[s] Australian businesses with access to a larger market for cost-effective emission reductions' and that it 'reaffirms that carbon markets are the prime vehicle for tackling climate change and the most efficient means of achieving emissions reductions.' See Commission, 'Australia-EU Linking Agreement' (n 437).

announcement of the link was a reflection of the efficiency gains from trade in emissions allowances. With linking, Australia and the EU could have achieved their aggregate emissions targets at a lower aggregate abatement cost than in autarky, confirming the (static) efficiency arguments that underpin the theory of linking. However, the short-run welfare and political gains came at the cost of undermining the CPM's long-term carbon price signal that could potentially be instrumental in infusing dynamic efficiency.

6.5. Conclusion

This Chapter attempted to explain the durability of the EU ETS and the unravelling of the Australian CPM drawing on two strands of literature: credible commitments and veto players. The literature suggests that institutional constraints – internal and external – help entrench a policy by making policy reversal cumbersome and costly; by enticing policy adversaries that they have more to gain by adapting than continuing to fight; by encouraging long-term investments; and by creating new constituencies that benefit from the system.[609]

The analysis suggests that the success of institutional constraints in fostering credibility and increasing the costs of policy reversal is affected by the level of political polarisation in a given jurisdiction. Despite its several institutional innovations, the CPM unravelled because the highly polarised climate politics undermined the effectiveness of the institutions as constraints on policy change. The polarised climate politics also weakened the effectiveness of the CPM's investment and compensation schemes in creating sunk costs and generating a self-reinforcing cycle of positive feedback. By contrast, despite the EU ETS's lack of ingenious institutions such as the Australia's CCA and the rolling system of cap-setting, it has thus far proven durable because the low political polarisation among the EU institutions served as a far more effective mechanism of credible commitment.

The claim here is not that institutional constraints do not matter; it is rather that they need a favourable political climate to thrive and be effective. Institutional constraints, delegation and mechanisms of generating positive policy feedback enhance credibility and sustainability of an ETS when political polarisation over carbon policy is relatively low. This observation is contrary to the view that credibility

609 Patashnik, *Reforms at Risk* (n 526) 30; Stienberg (n 514) 273; Jordan and Matt (n 508).

of a policy increases with an increase in political polarisation.[610] The tales of the Australian CPM and the EU ETS suggest otherwise. Our conclusion is more in line with Frye's suggestion that high political polarisation erodes private actors' faith in a given policy.[611]

[610] See for instance Keefer and Stasavage (n 438).

[611] Frye (n 438). See also Breen and McMenamin (n 438).

7
Conclusion

This research set out to explain how linking different emissions trading systems (ETSs) might affect environmental effectiveness and cost-effectiveness of linked carbon markets. We contended that such analysis needs to move beyond examining how different theoretical ETS design variants affect economic efficiency and environmental integrity and capture the complexity of real-life ETSs. Accordingly, this dissertation attempted to address the economic efficiency and environmental integrity effects of linking ETSs by using real-life ETSs as case studies. Although the analysis primarily focused on assessing the economic efficiency and environmental integrity implications of linking ETSs, it also examined the implications of linking ETSs for policy priorities of linking-partner jurisdictions.

This Chapter discusses the main findings of the research along the lines of economic efficiency (Section 7.1), environmental integrity (Section 7.2), domestic policy priorities (Section 7.3), and policy durability (Section 7.4). Section 7.5 examines the future of linking ETSs and outlines an agenda for further research.

7.1. Linking and economic efficiency

Economic theory holds that linking ETSs leads to greater efficiency than in autarky.[612]

[612] See generally C Flachsland, R Marschinski and O Edenhofer, 'To Link or not to Link: Benefits and Disadvantages of Linking Cap-and-Trade Systems' (2009) 9 Climate Policy 358; A Tuerk and others, 'Linking Carbon Markets: Concepts, Case Studies and Pathways' (2009) 9 Climate Policy 341; G Gruell and L Taschini, 'Linking Emission Trading Schemes' [2012] Economics of Energy & Environmental Policy 31; JF Green, T Sterner and G Wagner, 'A Balance of Bottom-up and Top-down Linking Climate Policies' (2014) 4 Nature Climate Change 1064.

Linking ETSs diversifies abatement options by expanding carbon markets across space. The more diverse the abatement options, the higher the aggregate cost saving from trading in emissions rights. These economic predictions, predicated on linking between idealised ETSs, may not necessarily hold true in reality not least because real-life ETSs are different from the idealised permit-trading systems assumed in theoretical analyses. The analyses in Chapters 3-6 showed why and how different design elements of to-be-linked ETSs might affect economic efficiency.

Chapter 3 explained how different systems of allowance allocation may distort abatement decisions by using the free allocation rules of the EU ETS and the Australian Carbon Pricing Mechanism (CPM).[613] Whereas both the EU ETS and the Australian CPM allocate varying levels of allowances free of charge, each ETS's system of allocation vary along several lines.[614] One of these differences concerns the emissions-intensity benchmarks (baselines) that each ETS uses to determine the number of allowances that emissions-intensive trade-exposed (EITE) entities receive free of charge. The EU ETS bases its free allocation largely on product-specific benchmarks that are drawn up taking into account the average emissions-intensity of the 10 per cent most efficient installations producing the relevant product in the EU in the 2007/2008 period.[615] The Australian CPM, by contrast, allocated emissions allowances free of charge based on emissions-intensity baselines that reflected the average of an entire industry engaging in a relevant activity.[616]

Each allocation system distorts, albeit to differing degrees, firms' abatement decisions.[617] The distortion results from firms' expectation that the allocation

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[613] See text to notes 259–263 above in Chapter 3.

[614] See text to notes 252–256 above in Chapter 3.

[615] See Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the community [2009] OJ L140/63, arts 10a(1), 10a(2) & 10a(12) (hereafter: Revised Emissions Trading Directive).

[616] Clean Energy Amendment Regulation 2012 (No 1) 2012 (Cth), cls 906-907 (hereafter: Clean Energy Amendment Regulation). See also Commonwealth of Australia, *Securing a Clean Energy Future: The Australian Government's Climate Change Plan* (Australian Government 2011) 104-115.

[617] The degree to which each system's allocation rules distort abatement is likely to be different. The EU ETS's allocation rules incentivise installations less efficient than the top 10 per cent to improve efficiency, thereby increasing the number of allowances they receive free of charge. However, once an installation moves up the efficiency ladder and joins the elite '10 per cent most efficient installations', its incentives for further efficiency improvement are limited. By contrast, the Australian CPM's allocation baselines reflect an average emissions-intensity of an entire EITE industry engaging in a

benchmarks (baselines) will likely be updated periodically to take into account efficiency improvements realised over time.[618] The firms' expectation of updating reduces their incentives to beat the current benchmarks (baselines) as this will likely reduce the number of allowances they will receive in future allocation periods. This results in firms shying away from improving efficiency further unless the price of allowances exceeds the sum of their current marginal abatement cost (MAC) and the expected value of future allowances forgone by improving efficiency today.[619]

The effect of the free allowance allocation rules of the EU ETS and the Australian CPM is to create a divergence between a firm's MAC and the price of allowances.[620] If a firm expects that its current abatement behaviour affects its future allocations, if it is a seller, it will not be willing to sell allowances unless allowance prices exceed the sum of its MAC and the expected value of allowances that it will forgo by reducing output or undertaking abatement currently. If it is a buyer, it will be willing to pay a premium price that is well above its MAC. Because of firms' 'higher than MAC' valuation of an emissions allowance, the pre-linking or autarky equilibrium does not necessarily reflect an optimal allocation of resources where firm's MAC equals the price of allowances.

With trade in emissions allowances between the Australian CPM and the EU ETS, emissions abatement may not necessarily shift to a system where it could be achieved at a lower cost.[621] If Australian EITE entities enjoyed a lower MAC than their EU ETS counterparts, they would continue to buy allowances from the EU ETS until prices exceed the sum of their MAC and the expected value of future allowances that are forgone by undertaking abatement currently, shifting abatement

relevant activity. Hence firms' expectation that allocation baselines will be updated distorts abatement decisions of the whole industry (rather than just a subset of the installations as is the case in the EU ETS).

618 For the fourth phase of the EU ETS (2021-2030), the European Commission has, for instance, proposed to revise the current benchmarks to take into account 'technological progress achieved over time.' See Commission, 'Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments' COM (2015) 337 final, 6.

619 See, for instance, K Neuhoff, K Martinez and M Sato, 'Allocation, Incentives and Distortions: The Impact of EU ETS Emissions Allowance Allocations to the Electricity Sector' (2006) 6 Climate Policy 73, 75-77.

620 Neuhoff, Martinez and Sato (n 619).

621 See text to note 263 above in Chapter 3.

to a system with a higher MAC. An inefficient outcome. If Australian EITE entities had a higher MAC than their EU ETS counterparts, the former would be better off buying allowances from the EU ETS, thereby shifting abatement to the EU ETS. Even then, they will be willing to pay a premium price as their valuation of allowances does not necessarily reflect their MAC.

Chapter 4, which analysed market stabilisation measures of the EU ETS and the Korean ETS, further illustrated that the welfare effects of linking ETSs. The EU ETS's Market Stability Reserve (MSR) is designed as a quantity-based system of scarcity management.[622] It aims to manage scarcity in the EU ETS by adjusting annual auction volumes. If the surplus of allowances exceeds 833 million, it withholds allowances equivalent to 12 per cent of the surplus from future auction volumes.[623] If the allowance surplus falls below 400 million, 100 million allowances are added from the MSR to future auction volumes.[624]

The Korean market stabilisation measures differ from that of the EU in three key aspects. First, in contrast to the EU ETS's reliance on a single instrument, the Korean ETS has incorporated multiple instruments.[625] The measures attempt to influence supply-demand dynamics in the Korean ETS through quantity-based instruments (an allowance reserve scheme and a system of adjusting offset utilisation and allowance borrowing limits), price-based instruments (a temporary price floor and price ceiling), or pure fiat (requiring firms to hold a minimum or maximum quantity of emissions allowances).[626]

Second, the Korean ETS applies price-based conditions that are defined in

622 See generally Commission, 'Impact assessment accompanying the document concerning the establishment and operation of a Market Stability Reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC' COM (2014) 20 final.

623 Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC [2015] OJ L 264/1, art 1(5) (hereafter: The Market Stability Reserve decision).

624 The Market Stability Reserve decision, art 1(6).

625 See text to notes 325–328 above in Chapter 4.

626 Act on the Allocation and Trading of Greenhouse Gas Emission Permits [Act No 11690, 23 March 2013], art 23 (hereafter: Allocation and Trading Act); Enforcement Decree of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits [Presidential Decree No 24429, 23 March 2013], art 30 (hereafter: Enforcement Decree of the Allocation and Trading Act).

relative terms to activate its market stabilisation measures.[627] This contrasts to the MSR's quantity-based triggers that are defined in absolute terms. Third, in contrast to the EU ETS's rule-based and non-discretionary scarcity management system,[628] the Korean ETS's market stability measures are discretionary. They leave broad discretions to the Emission Permits Allocation Committee (EPAC) – a largely political body chaired by the Minister of Strategy and Finance.[629] For instance, even if the price-based triggers are met, the market stabilisation measures will not be activated unless a decision to that effect is taken by the EPAC.[630]

As pointed out in Section 4.4.1, the broad discretions left for the EPAC in stabilising the carbon market and the relative nature of the price-based triggers will likely cause policy-induced uncertainty. Because of the broad discretions left for the EPAC, it remains unclear whether it would take measures to address too low or too high allowance prices, and which of the multiple instruments it would adopt. The relative nature of the price-based triggers makes it difficult to anticipate how low or how high allowance prices need to become in absolute terms for the EPAC to take measures. With an intersystem trade in emissions allowances between the EU ETS and the Korean ETS, these policy-induced uncertainties will reach the EU ETS, affecting abatement and investment decisions in in the EU ETS.

The difference between the EU ETS and the Korean ETS in the type of triggers each employs to activate market stabilisation measures may also invite inconsistent policy interventions. If, for instance, the EU ETS's MSR starts deferring auctioning

[627] For instance, market stabilisation measures addressing 'too high' allowance prices may be taken under either of the following two conditions: (i) if average allowance prices in the preceding six consecutive months more than triple relative to the average allowance price in the past two years; or (ii) if the average allowance price in the preceding six consecutive months more than doubles relative to the average allowance price in the past two years *and* that the average trading volume of one month is at least twice the volume of the same month in the previous two years. Instruments addressing concerns of 'too low' allowance price may be introduced if the average price of allowances in the preceding month falls by more than 60 per cent relative to the average price for the two preceding years. Allocation and Trading Act, art 23; Enforcement Decree of the Allocation and Trading Act, art 30.

[628] COM (2014) 20 final, 17-21

[629] See note 324 above in Chapter 4.

[630] Article 23 of the Allocation and Trading Act, the statute that established the Korean ETS, states that the Minister of Environment, in consultation with the EPAC, '*may* take measures for stabilising markets', making the activation of the market stabilisation measures contingent up on regulator's decision.

of allowances because the allowance surplus in the market exceeds the 833 million allowances threshold, allowance prices will rise that may, in turn, activate the price-based triggers of the Korean ETS, prompting the Korean ETS to increase allowance supply in the market. The increase in the supply of allowance in the Korean market will again swell the allowance surplus, possibly setting the MSR in motion to absorb excess allowances. In short, each jurisdiction's market intervention might reverse the effects of the other, undermining price predictability and affecting abatement and investment decisions.

Chapter 4 also showed that the mechanisms of implementing Korean ETS's price floor will have implications for the efficiency of an EU-Korean carbon market.[631] If, for instance, the price floor is implemented through a fixed fee payable by regulated entities, it may lead to suboptimal abatement outcomes in a linked EU-Korea carbon market. If regulated entities are required to pay a fee and surrender an allowance per tonne of CO_2, their opportunity cost of switching to low-carbon abatement options decreases, leading them to switch to (previously) expensive low-carbon methods of abatement.[632] The switch to low-carbon abatement options decreases emissions and reduces demand for emissions allowances at any given price. Given a perfectly inelastic supply curve, the demand curve shifts to the left, resulting in a decrease in the equilibrium price.

In autarky, the allowance price drops by the amount of the fee, leaving the effective carbon price unaffected.[633] As an instrument of increasing allowance prices, the fee will fail to achieve its purpose. If anything, it will reinforce the downward spiral of allowance prices.[634] If the Korean ETS is linked to, say, the EU ETS, the decrease in demand in the Korean ETS will be too small to drive down prices by the same amount as the fee. With linking, the fee will increase the effective carbon price faced by Korean entities by (or a little less than) the level of the fee, creating a divergence in the carbon price faced by Korean entities and EU ETS entities. Since the efficiency of a linked carbon market rests on the equalisation of carbon prices (marginal abatement costs) across the linking-partner ETSs, the price divergence

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631 See text to notes 331–339 above in Chapter 4.

632 S Fankhauser, C Hepburn and J Park, 'Combining Multiple Policy Instruments: How not to Do It' (2011) 7-9, Grantham Research Institute on Climate Change and the Environment Working Paper No 38 <http://eprints.lse.ac.uk/37573> accessed 9 December 2015.

633 Fankhauser, Hepburn and Park (n 632).

634 See text to note 338 above in Chapter 4.

increases the overall cost of abatement and reverses (part of) the gains from trade.

In sum, the foregoing analysis shows why and how the welfare implications of linking ETSs depend on how the linking-partner ETSs are constructed, underscoring the need for a case-by-case analysis of the welfare implications of linking ETSs. This need not imply that ETSs with different design features will not gain from trade in emissions rights. As Tuerk and others pointed out, ETSs with different design features could establish mutually beneficial linkages.[635] As discussed in Chapter 5, for instance, differences concerning offset credit utilisation limits between linking-partner ETSs do not undermine economic efficiency.[636] Given different offset credit utilisation limits of the ETSs, linking merely allows shifting abatement to entities with the lowest abatement costs.

7.2. Linking and environmental effectiveness

Environmental effectiveness is a key attribute that gives permit trading an edge over price-based instruments such as pollution taxes. In its most basic sense, environmental effectiveness refers to whether an ETS achieves a predefined level of emissions reduction.[637] In theory, a cap-and-trade system is environmentally effective.[638] It puts an absolute limit on the amount of greenhouse gas (GHG) emissions that regulated entities could emit in a given period by issuing a limited number of pollution permits and requiring the entities to surrender a pollution permit for every tonne of CO_2 they emit over the specified period. Linking two or more cap-and-trade systems merely redistributes abatement between the systems, leaving aggregate emissions unaffected.

The conclusion that emissions trading, and by implication linking ETSs, is environmentally effective rests on the assumption that linking-partner ETSs have caps that are fixed *ex ante* and immune from adjustment *ex post*. The analyses in Chapter 3 (allowance allocation) and Chapter 4 (market stabilisation) showed that when either of the linking-partner ETSs allows an *ex post* adjustment of its cap, aggregate emissions under linking might exceed the level in autarky. The claim about

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[635] Tuerk and others (n 612).

[636] See text to notes 422–423 above in Chapter 5.

[637] See SE Weishaar, *Emissions Trading Design: A Critical Overview* (Edward Elgar 2014) 40-41.

[638] See, for instance, E Woerdman, Tradable Emissions Rights, in JG Backhaus (ed), *The Elgar Companion to Law and Economics* (Edward Elgar 2005) 367-368.

the environmental effectiveness of linking ETSs further assumes that each linking-partner ETS has a robust monitoring, reporting and verification (MRV) standards and a credible compliance and enforcement system.

As discussed in Chapter 3, a bilateral link between an ETS with a fixed cap (EU ETS) and another that allows *ex post* adjustment of its cap (Australian CPM) may result in more (or less) aggregate emissions than a pre-linking scenario.[639] The Australian CPM, which coupled the number of allowances firms receive free of charge to their level of production in a given period, rewarded firms for increasing their output.[640] The government distributed allowances at the beginning of each compliance period based on an estimation of firms' level of production for the period.[641] At the end of the compliance period, the number of freely allocated allowances are revised to account for firms' actual production levels, resulting in an increase or a decrease in the number of allowances relative to the quantity initially distributed.[642]

Depending on whether linking between the EU ETS and the Australian CPM increases or decreases allowance prices in the latter, aggregate emissions under linking may be lower or higher than in autarky. If the bilateral link reduced allowance prices in the Australian CPM, aggregate emissions would be higher under linking than in autarky. A decrease in allowance prices in the Australian CPM reduces input costs for Australian firms, shifting the supply curve in the product market to the right. The post-linking equilibrium quantity of Australian firm's products increases relative to the equilibrium quantity in autarky, requiring the Australian government to allocate more allowances than it would in autarky. The ultimate result is a level of emissions that exceeds the pre-linking level.[643]

The effect of the linking on environmental effectiveness would be the opposite

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[639] See text to notes 269–270 above in Chapter 3.

[640] Clean Energy Amendment Regulation, cls 906-907; Explanatory Memorandum, Clean Energy Bill 2011 (Cth), ch 5.23 (hereafter: Explanatory Memorandum); Commonwealth of Australia, *Securing a Clean Energy Future* (n 616) 104-115.

[641] Commonwealth of Australia, *Securing a Clean Energy Future* (n 616) 114.

[642] Explanatory Memorandum, ch 5.23; Commonwealth of Australia, *Securing a Clean Energy Future* (n 616) 114.

[643] If Australia and the EU went ahead with their planned linking, the aggregate emissions of the Australian CPM and the EU ETS would be higher under linking than in autarky. The linking was expected to decrease Australian carbon prices, slashing Australian EITE firms' input costs, incentivising them to expand output, and requiring the Austrian government to issue far more emissions allowances under linking than in autarky.

if allowance prices in the Australian CPM increased due to linking. The rise in allowance prices increases input costs for Australian firms, shifting the supply schedule for the firms' products to the left and decreasing firms' output relative to autarky. The fall in firms' output means that the Australian government would allocate fewer number of allowances than it would in autarky, resulting in lower aggregate emissions under linking.

The analysis in Chapter 4, focusing on the market stabilisation measures of the EU ETS and the Korean ETS, further illustrates how linking might undermine environmental integrity when either of the linking-partner ETSs allows an *ex post* adjustment of its cap.[644] The Korean ETS aims to control allowance price spikes by, *inter alia*, setting a temporary price ceiling.[645] By setting a price ceiling, the government increases the supply of allowances either by selling allowances at the ceiling price, allowing firms to comply with their obligation through the payment of the ceiling price in lieu of surrendering allowances, or allocating additional allowances from an allowance reserve pool.[646] Whichever approach is followed, in a post-linking world, the Korean government would need to address a surge in demand not only from its own regulated entities but also from entities in its linking-partner ETSs. This would require the government to issue far more allowances than it would in autarky, leading to more emissions under linking than in autarky.[647]

The environmental integrity of an ETS has also come to be associated with whether emissions units accepted as instruments of compliance by the ETS represent real, permanent and verifiable emissions reductions, which in turn depends on the robustness of MRV standards.[648] The controversy over the use of offset credits for

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[644] See text to notes 340–343 above in Chapter 4.

[645] Allocation and Trading Act, art 23; Enforcement Decree of the Allocation and Trading Act, art 30.

[646] See text to notes 342–343 above in Chapter 4.

[647] It is also plausible to argue that linking ETSs, by increasing liquidity and reducing price volatility, may reduce the need for using a price ceiling as a market stabilisation measure. As a result, aggregate emissions under linking could be lower than in autarky. On the other hand, linking ETSs also creates contagion of localised price shocks from one ETS to linking-partner ETSs, requiring linking-partner jurisdictions to use market stabilisation measures more frequently than under a pre-linking scenario. See the discussion in Section 7.3 below.

[648] See A Prag, G Briner and C Hood, 'Making Markets: Unpacking Design and Governance of Carbon Market Mechanisms' (2012) 21, Climate Change Expert Group Paper No. 2012(3), OECD/IEA <http://dx.doi.org/10.1787/5k43nhks65xs-en> accessed 4 September 2016. See also T Tietenberg, 'The Tradable Permits Approach to Protecting the Commons' in E Ostrom and others (eds) *The Drama of the Commons* (National Academies Press 2002) 200-201.

compliance purposes centre on whether the credits represent additional, permanent and verifiable emissions reductions.[649] These concerns are reflected in several ETS's restrictions on the use of offset credits for compliance purposes.[650] Because the restrictions on the use of offset credits vary from one ETS to another, their implication for linking ETSs have been examined in the linking literature. The literature suggests that they constitute significant impediments to linking.[651] A bilateral link between an ETS that bans certain types of offset credits and another that accepts these credits, so the argument goes, creates a 'backdoor problem' whereby the latter system is used to circumvent the restrictions of the former, undermining its environmental effectiveness.

As explained in Chapter 5, the logic behind the 'backdoor problem' is misleading. First, with or without linking, offset credits that do not represent additional, permanent and verifiable emissions reductions will continue to be used in ETSs across the world.[652] As climate change knows no national borders, it is irrelevant whether those offset credits are used with in a (sub)national ETS or a linked carbon market. Second, even if it is possible to envisage cases in which linking ETSs might lead to a worse environmental outcome relative to autarky, this depends on the types of assumptions one makes about firms' compliance behaviour and the effect of linking on allowance prices of the linking-partner ETSs.[653] For instance, linking ETSs with different credit utilisation limits will not lead to more aggregate emissions than in autarky if we assume that firms in both linking-partner ETSs fully utilise their credit quota in autarky.[654]

Under a different set of assumptions, one will arrive at a different conclusion. Assume, for instance, that, in autarky, entities covered under one ETS (*ETS-A*) exhaust their credit limits while entities covered under a linking-partner ETS (*ETS-B*) use up only part of their credit utilisation quota. If allowance prices rise in

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[649] See, for instance, DM Driesen, 'Linkage and Multilevel Governance' (2009) 19 Duke Journal of Comparative & International Law 389, 399-401.

[650] See the discussion in Section 5.3 above in Chapter 5.

[651] See, for instance, Tuerk and others (n 612) 346-348; J Jakob-Gallmann, *Regulatory Issues in the Carbon Market: The Linkage of the Emissions Trading System of Switzerland with the Emissions Trading Scheme of the European Union* (Schulthess 2011) 140-142; House of Commons Energy and Climate Change Committee, *Linking Emissions Trading Systems* (HC 2014-15, HC 739) 14.

[652] See text to notes 419–421 above in Chapter 5.

[653] See text to notes 422–423 above in Chapter 5.

[654] See the discussion in Section 5.4.2 above in Chapter 5.

ETS-A and fall in *ETS-B* following linking, the demand for offset credits will likely rise in *ETS-A* and fall in *ETS-B*.[655] The post-linking level of emissions may increase relative to the level of emissions in autarky if the rise in demand for offset credits from *ETS-A* is greater than the fall in demand (increase in supply) from ETS-B. The thrust of the preceding analysis is that it is not a given that different offset provisions undermine environmental integrity.

7.3. Linking and domestic policy objectives

While cost effectiveness and environmental effectiveness could be considered as the overarching objectives of an ETS, they are by no means the only policy objectives that guide ETS design. Cap-and-trade systems are often charged with achieving additional goals including raising government revenue, ensuring economic growth and incentivising investment in clean technologies.[656] The attempt to address multiple goals raises a daunting issue of how to balance competing societal interests in ETS design.[657] From the perspective of linking ETSs, the relevant question concerns whether and how additional policy priorities of linking-partner jurisdictions might affect (be affected by) linking.

First, pursuing additional policy priorities, while legitimate, might come at the cost of undermining environmental integrity and economic efficiency. For instance, Australian CPM's production-based allocation system caters for competitiveness and carbon leakage concerns, thereby reducing the impact of carbon pricing on economic growth.[658] Similarly, The EU ETS's ban on CDM credits from non-LDCs aims at redirecting funds from advanced developing countries (such as Brazil, China and India), which have hosted and benefited from most of the

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[655] Since offset credits are substitutes for 'regular' emissions allowances, an increase (a decrease) in the price of the 'regular' allowances will increase (decrease) the demand for offset credits.

[656] Weishaar, *Emissions Trading Design* (n 637) 42-48.

[657] Weishaar, *Emissions Trading Design* (n 637) 39.

[658] The Australian CPM's allocation system constitutes a *de facto* production subsidy. See D Burtraw and others, 'The Effect of Allowance Allocation on the Cost of Carbon Emission Trading' (2001) 29, Resource for the Future Discussion Paper 01-30 <http://www.rff.org/RFF/documents/RFF-DP-01-30.pdf> accessed 8 December 2015; RN Stavins and J Jaffe, 'Linking Tradable Permit Systems for Greenhouse Gas Emissions: Opportunities, Implications, and Challenges' (IETA 2007) 37, Report for International Emissions Trading Association <http://belfercenter.hks.harvard.edu/files/IETA_Linking_Report.pdf> accessed 7 December 2015.

CDM projects,[659] to LDCs, thereby supporting sustainable development efforts of the latter.[660] The preferential treatment accorded to credits generated domestically (over international credits) in the Australian, Chinese and Korean ETSs encourage emissions abatement within domestic sources of pollution and broaden the carbon price signal to uncapped sectors.[661] However, each of these come at the cost of reducing the efficiency or environmental integrity of the respective markets. The Australian CPM's production-based allocation system undermines, as discussed in Chapter 3, both environmental integrity and economic efficiency.[662] The restriction on the use of offset credits is antithetical to linking ETSs as a free trade ideal. It interferes with the price mechanism of allocating emissions abatement to whichever firm that is able to achieve it at the lowest abatement cost, thereby reducing the cost-effectiveness of an ETS.

Second, linking ETSs might undermine the realisation of some policy priorities. The analysis in Chapters 5 and 6 showed, for instance, how the linking between the Australian CPM and the EU ETS undermined some of Australia's policy priorities.[663] The linking, which lead to the abolition of the CPM's price floor and the consequent crashing of the CPM's expected carbon price for 2015 from near A\$30/tCO_2 to A\$12/tCO_2, eroded the CPM's relatively high carbon price signal and undermined Australia's goal of incentivising long-term low-carbon investments.[664] The price crash also slashed the government's expected earnings from the sale of emissions allowances, reducing government funds available for the many schemes designed to transition Australia's economy to a low-carbon future. The linking also discouraged abatement in sectors participating in the domestic offset programme – the Carbon Farming Initiative – not only by weakening the CPM's price signal as a driver of abatement but also by ending the preferential treatment that CFI credits enjoyed

[659] China, India and Mexico have hosted approximately a disproportionate 85 per cent of the CDM projects. African countries, by contrast, have hosted a meagre 4.4 per cent of the CDM projects. See UNEP DTU (United Nations Environment Programme Danish Technical University), 'Content of CDM/JI Pipeline Database 1 December 2016', <http://cdmpipeline.org/cdm-projects-region.htm> accessed 26 December 2016.

[660] See text to note 424 above in Chapter 5.

[661] R Trotignon, 'Combining Cap-and-Trade with Offsets: Lessons from the EU-ETS' (2011) 12 Climate Policy 273.

[662] See the discussion in Section 3.4.2 (A and C) above in Chapter 3.

[663] See text to notes 425–426 above in Chapter 5 and text to notes 606–608 above in Chapter 6.

[664] See text to notes 606–607 above in Chapter 6.

prior to the linking arrangement.[665]

Third, mechanisms of realising additional policy priorities might become less effective under linking than in autarky. Chapter 4 illustrated this point by outlining the difficulties of implementing the Korean ETS's price floor through an auction reserve price or a government buyback scheme – alternative approaches to implementing a price floor.[666] Linking ETSs creates regulatory inflexibility because it requires each linking-partner jurisdiction to cede some control over its climate policy, making some policy responses contingent on linking-partner jurisdictions acquiescence.[667] Even if we assume away challenges arising from the issue of shared-sovereignty, linking will render an auction reserve price ineffective and a government buyback scheme costly, both relative to a pre-linking scenario. An auction reserve price would not establish a floor price in autarky because the share of auctioned allowances in the Korean ETS is too small to guarantee a minimum carbon price.[668] Linking the Korean ETS with the EU ETS will compound the problem because the EU ETS lacks a similar system of setting reserve prices at auctions. Similarly, the financial burden of implementing a price floor through a government buyback scheme swells with linking because the Korean government must buy allowances coming (also) from the EU ETS.

Fourth, different policy priorities of linking-partner ETSs create political obstacles for linking. As explained in Chapter 4, Korea and the EU differ in their approaches towards stabilising their respective carbon markets.[669] With a blend of price and quantity instruments and a broad discretion left for the EPAC, Korea's approach to stabilising its ETS could be characterised as one of 'keeping all options on the table'. The active involvement of the EPAC allows the government to keep a tight rein on carbon prices and control the economic effects of the ETS. By contrast, the EU has built the MSR as a rule-based, non-discretionary and predictable mechanism. It has also shown an aversion to price-based instruments, casting them

[665] See text to note 425 above in Chapter 5.

[666] See text to notes 348–350 above in Chapter 4.

[667] R Garnaut, *The Garnaut Climate Change Review: Final Report* (Cambridge University Press 2008) 228. See also S Borghesi, M Montini and A Barreca, *The European Union Emission Trading System and Its Followers: Comparative Analysis and Linking Perspectives* (Springer 2016) 96.

[668] See text to notes 348–349 above Chapter 4.

[669] See text to notes 351–355 above in Chapter 4.

as inherently incompatible with the EU ETS's design as a quantity instrument.[670] In an EU-Korean carbon market, it will become difficult to reconcile Korea's appetite for broad discretions with the EU's goal of ensuring a rule-based system that leaves little or no discretion to policymakers. The EU is also likely to resist the idea of regulating prices directly through price floors and price ceilings. Although combining price and quantity instruments may make economic sense, politics may trump good economics.

7.4. Policy durability and linking

An ETS, as any public policy, faces risks of unravelling because of political uncertainty created by electoral politics and time-inconsistent incentives of policymakers.[671] The durability of linking-partner ETSs is critical for a successful linking. A decision to delink or mere speculation about delinking, as Pizer and Yates showed, leads to a divergence in allowance prices between the linking-partner ETSs before the delinking occurs, increasing the costs of abatement.[672] Applying a three-pronged theoretical framework focusing on commitment devices, policy feedback and political polarisation, we attempted to explain the durability of the EU ETS and the unravelling of the Australian CPM and what this means for linking ETSs in general.

The Australian CPM was designed with an eye on making it politically sustainable. The wider climate and energy policy reform, which the CPM was a part, and the CPM itself incorporated various mechanisms and institutional features that could help the CPM prosper in an uncertain political future. These include ingenious design features such as an independent Climate Change Authority and a rolling system of cap-setting that could make policy change cumbersome and foster credibility;[673] revenue recycling schemes that could build new constituencies that

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670 COM (2014) 20 final, 21.

671 See generally T Moe, 'The politics of Structural Choice: Toward a Theory of Public Bureaucracy', in OE Williamson (ed), *Organization Theory: From Chester Barnard to the Present and Beyond* (Oxford University Press 1990); KA Shepsle, 'Discretion, Institutions and the Problem of Government Commitment' in P Bourdieu and J Coleman, *Social Theory for a Changing Society* (Westview Press 1991); P Pierson, *Politics in Time: History, Institutions, and Social Analysis* (Princeton University Press 2004) 41-42.

672 See generally WA Pizer and AJ Yates, 'Terminating Links between Emission Trading Programs' (2015) 71 Journal of Environmental Economics and Management 142.

673 Climate Change Authority Act 2011 (No 143) 2011 (Cth), ss 10-13 (hereafter: Climate Change Authority Act); Commonwealth of Australia, *Securing a Clean Energy Future* (n 616) 110-111; RJ

benefit from the CPM and reconfigure the interests of the CPM's adversaries;[674] and funding and investment schemes that could increase the costs of unravelling the CPM by creating sunk costs.[675] The 2012 agreement between Australia and the EU to link their respective ETSs as of 2015 could also serve as an external institutional constraint, further increasing the costs of abolishing the CPM.[676]

In contrast, the EU ETS was not designed with the type of institutional constraints and investment schemes that accompanied the Australian CPM. If anything, its enactment was preceded by a successful opposition by both Member States and businesses to a carbon tax proposed by the European Commission in the early 1990s.[677] In addition, the short history of the EU ETS has been dotted with various post-enactment challenges – from over-allocation to oversupply – that could erode support for the ETS and threaten its political sustainability.[678]

In practice, neither of the institutional constraints and funding and investment schemes was able to save the Australian CPM from unravelling, and the EU ETS manages to survive despite the many challenges it has faced over the years. Our analysis suggests a negative correlation between political polarisation over climate change policy, on the one hand, and effectiveness of institutional constraints and policy feedback, on the other. The pre-enactment politics of the Australian CPM is markedly different from that of the EU ETS. Australia has seen a highly partisan climate politics relative to the EU.[679] This does not come as a surprise not least because political parties in nation states are likely to use climate change policy to

Keenan and others, 'Science and the Governance of Australia's Climate Regime' (2012) 2 Nature Climate Change 477.

674 See text to notes 576–578 above in Chapter 6.

675 See text to notes 579–582 above in Chapter 6.

676 Commission, 'Australia and European Commission agree on pathway towards fully linking Emissions Trading Systems' *European Commission* (Brussels, 28 August 2012) <http://europa.eu/rapid/press-release_IP-12-916_en.htm?locale=en> accessed 8 November 2016; S Brunner, C Flachsland and R Marschinski, 'Credible Commitment in Carbon Policy' (2012) 12 Climate Policy 255, 268; Pizer and Yates (n 672) 145.

677 A Jordan and T Rayner, 'The Evolution of Climate Policy in the European Union: A Historical Overview' in A Jordan and others, *Climate Change Policy in the European Union: Confronting the Dilemmas of Mitigation and Adaptation?* (Cambridge University Press 2010) 59; JB Skjærseth and J Wettestad, *EU Emissions Trading: Initiation, Decision-Making and Implementation* (Ashgate 2008) 32.

678 See text to note 564 above in Chapter 6.

679 See Section 6.2.1 above in Chapter 6 for a discussion about the politics of climate change policy in Australia.

carve out distinct profiles in the hope of gaining electoral advantages. In Australia too, both the Coalition and Labor have successfully used climate change policy for their respective electoral benefits.[680] The supranational structure of the EU, by contrast, has shielded the EU ETS from being used as an electoral ploy.

Australia's highly partisan climate politics afforded firms significant scope to resist the pricing of carbon, discouraged long-term investments specific to the CPM, and limited the effectiveness of the various funding and investment schemes in generating a cycle of positive policy feedback.[681] Australia's parliamentary system, which concentrates political power, makes initiating and reversing a policy easier. Because the two major political parties held opposite views on the CPM, the CPM suffered a credibility deficit, increasing firms' payoff from opposing the CPM and discouraging long-term low-carbon investments.

By contrast, the relatively low political polarisation over climate policy in the EU, especially during the formative years of the EU ETS, helped not only in turning businesses' historic animosity to carbon pricing into a cautious embrace of the EU ETS, but also in rescuing the EU ETS from potentially fatal post-enactment policy challenges.[682] The EU ETS has also benefited from a stable agenda-setter – the Commission – that has historically used climate change policy to empower itself, deepen European integration and project EU's soft power overseas.[683]

What have all these to do with linking ETSs? The analysis suggests how linking-partner jurisdictions' domestic politics might affect the design and structure of linking arrangements and the trade-offs involved in using linking as a mechanism of increasing the costs of unravelling an ETS. Whether linking ETSs serves as an effective external institutional constraint, thereby increasing the costs of unravelling the linking-partner ETSs, depends on several factors including the legal form and design of the linking agreement and the nature of climate change politics in the linking-partner jurisdictions.[684] In a continuum between soft law and hard law

[680] See text to notes 493–498 above in Chapter 6.

[681] See text to notes 584–587 above in Chapter 6.

[682] See text to notes 588–593 above in Chapter 6.

[683] Jordan and Rayner (n 677) 56; MA Schreurs and Y Tiberghien, 'European Union Leadership in Climate Change: Mitigation through Multilevel Reinforcement' in K Harrison and L Sundstrom (eds), *Global Commons, Domestic Decisions: The Comparative Politics of Climate Change* (The MIT Press 2010) 39.

[684] AT Guzman, 'The Design of International Agreements' (2005) 16 The European Journal of

instruments, exit costs increase as one moves from soft law to hard law instruments.[685] Although a linking agreement could be designed to impose high costs of exit, doing so leaves limited flexibility for the linking-partner jurisdictions to adapt to changing circumstances.[686]

Regarding the effect of political polarisation on the political sustainability of ETSs, the more polarised a linking partner's domestic climate change politics, the higher the likelihood that its ETS might unravel. With a less polarised domestic politics on climate change, the risk of significant changes from the status quo is low, creating a conducive environment for a durable climate policy. If the linking is between ETSs with low political polarisation over climate policy, the linking-partner jurisdictions enjoy significant scope to structure the linking agreement without the need to worry about using the linking agreement to counter risks of policy reversal.

7.5. Looking ahead: the road from Paris

When linking ETSs was flouted in the early 2000s as a cost-effective way of achieving aggregate emissions reduction targets of linking-partner jurisdictions, the expectation was (and, to an extent, has been) that linkages would start at a bilateral level and, in time, expand by adding new members.[687] Despite the fact that building a truly global carbon market through linking ETSs has proven more difficult than initially anticipated, interest in linking has not waned.[688]

International Law 579; T Ginsburg, 'Locking in Democracy: Constitutions, Commitment, and International Law' (2006) 38 International Law and Politics 707, 730-731; TL Meyer, Power, Exit Costs, and Renegotiation in International Law' (2010) 51 Harvard International Law Journal 379, 393-396; LR Helfer, 'Flexibility in International Agreements' in JL Dunoff and MA Pollack (eds), *Interdisciplinary Perspectives on International Law and International Relations: The State of the Art* (Cambridge University Press 2011).

685 Meyer (684) 395-396.

686 Meyer (684) 394-396; Helfer (n 684).

687 For instance, when in 2009 the EU set out a goal of connecting carbon markets in the OECD by 2015, the intuition was that the EU ETS would serve as a centre of gravity, attracting new ETSs and growing into a truly multilateral carbon market. Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards a comprehensive climate change agreement in Copenhagen' COM (2009) 39/3 final, 11.

688 For instance, Maroš Šefcovic, European Commission's Vice President for Energy Union, reiterated in 2016 the EU's readiness 'to explore with (...) international partners like China, Quebec, Ontario, Manitoba, California and South Korea the possibilities of a global system of linked markets.' See

The manner in which bilateral and multilateral linkages develop and evolve over time will affect the success of the bottom-up process of liberalising trade in emissions rights through linking ETSs. Existing linkages between the EU ETS and the Swiss ETS in Europe and that of Californian and Quebec ETSs in North America seem to suggest a trend in regionalism — a clustering of ETSs in a similar geographic zone into a regional ETS.[689] Geographical closeness, strong trade ties and shared political institutions will likely facilitate the growth of regionally clustered ETSs.[690] If regionalism continues, it will raise a number of issues. The first issue concerns whether regionally clustered ETSs constitute, in trade theory terms,[691] 'building blocks' or 'stumbling blocks' to the process of building a global carbon market from the bottom-up. As Garnaut suggests, regional ETSs could be welcomed as 'natural stepping stones towards greater international integration.'[692] On the other hand, regional ETSs may develop idiosyncratic institutional and governance architectures, further fragmenting the emissions trading landscape and making the move towards multilateralisation difficult.[693]

The second issue concerns how regional ETSs might evolve into something different, requiring exploring mechanisms of multilateralising regional ETSs. An ambitious approach of multilateralisation suggested by the World Bank Task Force to Catalyse Climate Action is the concept of 'Networked Carbon Markets' (NCM).[694] Under the NCM jurisdictions with ETSs voluntarily opt-in and submit their

Carbon Pulse, 'The EU Eyes Interlinked Carbon Markets from California to China' *Carbon Pulse* (London, 25 February 2016) <http://carbon-pulse.com/16116/> accessed 03 June 2017. See also text to notes 41–43 above in Chapter 1.

689 The botched link between the EU ETS and the Australian CPM bucked this trend.

690 See generally M Betsill, 'Regional Governance of Global Climate Change: The North American Commission for Environmental Cooperation' (2007) 7 Global Environmental Politics 11; MA Mehling and E Haites, 'Mechanisms for Linking Emissions Trading Schemes' (2009) 9 Climate Policy 169.

691 J Bhagwati, 'Regionalism versus Multilateralism' (1992) 15 World Economy 535. See also RE Baldwin, 'Multilateralising Regionalism: Spaghetti Bowls as Building Blocs on the Path to Global Free Trade' (2006) 29 World Economy 1451.

692 See Garnaut (n 667) 228.

693 See MA Mehling, 'Legal Frameworks for Linking National Emissions Trading Systems' in Carlarne CP, Gray KR and Tarasofsky RG (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press 2016) 275.

694 See, for instance, J Macinante, 'Networking Carbon Markets: Key Elements of the Process' (World Bank 2016) <http://hdl.handle.net/10986/25750> accessed 28 December 2016..

emissions units for rating by private rating agencies for their 'mitigation value'. The mitigation values will then be converted into exchange rates, allowing convertibility of different carbon currencies into one another. This approach has the potential to address linking challenges arising from differences in, for instance, the relative stringency of the linking-partner jurisdictions' emissions reduction targets.[695] It is unclear, however, why political-economy factors that make a conventional bilateral/multilateral linking difficult will not bog down this approach. In addition, as Mehling points out, it will raise difficult political and fairness issues that have long slowed progress of climate change negotiations under the United Nations Framework Convention on Climate Change (UNFCCC).[696] Multilateralising regional ETSs thus requires understanding the balance of political-economy forces that give rise to regionalism and how different approaches of multilateralisation affect the balance of interests that defined the move towards regionalism.

The Paris Agreement, a global climate deal agreed between 196 Parties in December 2015 in Paris, could facilitate the process of multilateralising regional ETSs. Article 6 of the Paris Agreement 'recognises' voluntary transfer of mitigation outcomes among Parties through 'internationally transferred mitigation outcomes' (ITMOs).[697] Voluntary cooperation among Parties through the transfer of ITMOs has been interpreted to encompass all types of cooperation including linking different climate policy instruments such as command-and-control instruments, carbon taxes and ETSs, ushering a new era where diverse climate policy instruments could be linked to one another of ETSs.[698] Moving beyond liking of ETSs and encompassing

[695] See Mehling (n 683).

[696] See Mehling (n 683) 276.

[697] *Paris Agreement*, opened for signature 22 April 2016 (entered into force 4 November 2016) art 6(1).

[698] A Marcu, 'Carbon Market Provisions in the Paris Agreement (Article 6), (January 2016) CEPS Special Report No 128 <https://www.ceps.eu/publications/carbon-market-provisions-paris-agreement-article-6> accessed 7 September 2016, 4. Such a link could take three forms: (i) linking between ETSs ('ETS-only'); (ii) linking between ETSs and carbon tax regimes ('ETS-tax'); (iii) linking between ETSs and carbon tax systems with command-control instruments ('ETS-tax-regulatory'). However, linking different climate policy instruments has its own risks. For instance, linking a quantity instrument such as an ETS and a price instrument such as a carbon tax raises environmental effectiveness concerns not least because, absent some form of quantitative restriction, an unlimited flow of credits/allowances from the tax system to the ETS will dilute the ETS's price signal and turn it into a *de facto* tax scheme. See C Haug, M Frerk and M Santikarn, 'Towards a Global Price on Carbon: Pathways for Linking Carbon Pricing Instruments' (Adelphi 2015), Background Report to Inform the G7 Process <https://www.adelphi.de/en/publication/towards-global-price-carbon-pathways-linking-carbon-pricing-

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other climate policy instruments allows greater coordination of climate change policy internationally, allowing countries to achieve their aggregate emissions reduction target at a lower cost.[699]

When countries cooperate through ITMOs, they are required to 'promote sustainable development and transparency, … [and] apply robust accounting to ensure, inter alia, the avoidance of double counting.'[700] The Agreement, however, specified neither the conditions nor the mechanisms of ensuring environmental integrity and sustainable development. Subsequent agreements under the umbrella of the Paris Agreement could buttress international cooperation on climate policy by, for instance, defining a mechanism (similar to the Kyoto's Assigned Amount Unit) to track the transfer of 'mitigation outcomes' between countries, hence addressing the issue of double counting. Developing international accounting and monitoring, reporting and verification rules will also contribute towards addressing some of the environmental integrity concerns associated with cross border trade in emissions allowances.

instruments> accessed 23 October 2016.

[699] GE Metcalf and D Weisbach, 'Linking Policies when Tastes Differ: Global Climate Policy in a Heterogeneous World' (2012) 6 Review of Environmental Economics and Policy 110.

[700] The Paris Agreement, art 6(2).

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Appendices

English summary

Nederlandse samenvatting

A

English Summary

Emissions trading constitutes an important component of several countries' climate change policy arsenal. The number of emissions trading systems (ETSs) in force has risen from one in 2005 to 18 in 2017. The number is set to increase in the coming few years with several countries, most notably China, planning to launch their respective ETSs. Despite the proliferation of emissions trading as a preferred instrument of climate policy over the past decade, the global emissions trading landscape remains fragmented in that existing ETSs, save a handful of exceptions, are not linked and do not recognise each other's emissions units as instruments of compliance.

Two or more ETSs establish bilateral/multilateral link by recognising each other's emissions units as valid instruments of compliance, creating fungibility between the emissions units of the linking-partner ETSs. Economic theory suggests that linking ETSs leads to a more efficient allocation of resources relative to autarky. Allowance prices vary significantly across existing ETSS, reflecting differences in the costs of abatement that firms face in each jurisdiction. The different allowance prices also reflect potential welfare gains that could have been realised had trade in emissions allowances been allowed between the ETSs. The trade in emissions allowances equalises allowance prices (marginal costs of abatement) across the linking-partner ETS and lowers total costs of abatement compared to autarky. In short, linking ETSs benefits all linking-partner jurisdictions without affecting aggregate emissions.

The theoretical observation that linking ETSs enhances welfare assumes that the linking is between 'properly' designed ETSs that are themselves internally efficient in autarky. Because designing ETSs is a political process, ETSs reflect compromises between different constituencies in their relevant jurisdictions. They are also often charged with achieving policy goals other than realising some predefined emissions reduction targets cost-effectively. The political process of designing ETS, coupled

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with political-economy conditions that vary across jurisdictions, has resulted in ETSs with heterogeneous system designs and different, if not inconsistent, policy priorities. Whether linking ETSs in practice achieves the aggregate emissions reduction targets of the linking-partner jurisdictions cost-effectively crucially depends on how the linking-partner ETSs are constructed, requiring a case-by-case analysis of the welfare effects of linking ETSs.

This dissertation analysed, following a law and economics approach, if and how linking ETSs affect welfare by using real-life ETSs as case studies. In doing so, the research focused on four issue areas – free allocation systems, offset provisions, market stabilisation measures, and policy durability. The economic efficiency and environmental effectiveness effects of each of the issues (except offset provisions) is examined in a bilateral linking scenario involving two of the following ETSs: the European Union Emissions Trading System (EU ETS), the Australian Carbon Pricing Mechanism (CPM), and the South Korean ETS. The analysis on offset provisions relies on a review of the offset policies of major ETSs currently in force. Although the analysis primarily focuses on assessing the economic efficiency and environmental integrity implications of linking ETSs, it also discusses the implications of linking ETSs for policy priorities of linking-partner jurisdictions.

The analysis shows why and how the manner in which linking-partner are constructed influences the effects of linking ETSs on both economic efficiency and environmental integrity. For instance, it shows that the Australian CPM's and the EU ETS's free allowance allocation systems discourage, in a bilateral linking scenario between the two ETSs, firms from shifting emissions abatement to the system with a lower marginal abatement cost. Also, the Australian CPM's system of coupling the number of allowances a firm receives free of charge to, inter alia, its level of production in a given compliance period could lead to more aggregate emissions than a pre-linking scenario, thereby undermining environmental effectiveness. Similarly, the different market stabilisation measures of the EU ETS and the Korean ETS raise both efficiency and environmental integrity concerns.

The analysis also shows both the costs and difficulties of accommodating policy goals other than economic efficiency and environmental integrity in the context of linked carbon markets. For instance, although the EU ETS's ban on Certified Emissions Reductions from credits from non-least developed countries (LDCs) supports sustainable development efforts of LDCs by redirecting funds from advanced developing countries to LDCs, it interferes with the price mechanism of allocating emissions abatement to whichever firm that is able to achieve it at the lowest possible abatement cost, thereby reducing the cost-effectiveness of an ETS. Moreover, the benefits from linking ETSs might come at the cost of undermining some policy priorities of the linking-partner jurisdictions. For instance, the linking between the Australian CPM and the EU ETS, which resulted in the crashing of the CPM's expected carbon price for 2015 and beyond, eroded the CPM's relatively high carbon price signal, undermining Australia's goal of incentivising long-term low-carbon investments.

Looking ahead, linking ETSs will likely form an essential component of international cooperation on climate change mitigation. It is however doubtful if a truly global carbon market would emerge from the bottom up process. Existing linkages suggest a trend in regionalism with ETSs in a similar geographic area clustering to form a linked carbon market. Although the emergence of regional ETSs could be seen as an important first step towards building a truly global carbon market, there is no guarantee that multilateralization will follow from regionalisation. It could very well happen that regionally clustered ETSs may develop idiosyncratic institutional and governance architectures, making further linkages between several regional ETSs difficult. The latter prospect raises an intellectual and policy challenge of finding ways of multilateralising regionally clustered ETSs.

Nederlandse Samenvatting

De handel in emissierechten is voor sommige landen een belangrijk element in het arsenaal aan beleidsmiddelen tegen klimaatverandering. Het aantal van kracht zijnde emissiehandelssysteem is toegenomen van één in 2005 naar achttien in 2017. Dit aantal zal de komende jaren verder toenemen nu diverse landen, waaronder China, ook emissiehandelssystemen hebben aangekondigd. De afgelopen tien jaar is de emissiehandel uitgegroeid tot voorkeursinstrument voor klimaatbeleid. Toch toont de emissiehandel wereldwijd gezien een versnipperd beeld; de regelingen (enkele uitzonderingen daargelaten) zijn niet gekoppeld en over en weer worden de emissie-eenheden niet als nalevingsinstrument erkend.

Wanneer twee of meer emissiehandelssystemen bilateraal of multilateraal worden gekoppeld en ze elkaars emissie-eenheden als nalevingsinstrument erkennen, dan worden de emissie-eenheden onderling uitwisselbaar. Volgens de economische theorie leidt het koppelen van deze systemen tot een efficiëntere verdeling van middelen dan bij niet-gekoppelde systemen. De prijzen van de emissierechten in de verschillende systemen variëren sterk, omdat ondernemingen in verschillende rechtsgebieden te maken hebben met verschillen in kosten die de maatregelen voor emissiereductie met zich meebrengen. Deze prijsverschillen laten zien dat er een welvaartswinst kan worden verwacht als emissiehandel tussen de diverse systemen zou zijn toegestaan. De emissiehandel heeft een nivellerende werking op de prijzen van emissierechten (marginale emissiereductiekosten) bij de gekoppelde handelssystemen en leidt ook tot lagere algemene emissiereductiekosten dan bij afzonderlijke systemen. Kortom, als we handelssystemen koppelen is dat gunstig voor alle betrokken rechtsgebieden zonder dat dit de totale emissiehoeveelheid nadelig beïnvloedt.

De theoretische vaststelling dat het koppelen van handelssystemen welvaartswinst oplevert, veronderstelt dat de systemen naar behoren zijn opgezet;

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dat wil zeggen, ze moeten ook afzonderlijk efficiënt functioneren. De ontwikkeling van emissiehandelsregelingen is een politiek proces en reflecteert ook compromissen die de verschillende belanghebbenden hebben gesloten in hun respectievelijke rechtsgebieden. Deze belanghebbenden zijn vaak belast met het behalen van andere beleidsdoelen dan het kosteneffectief realiseren van targets voor emissiereductie. Het politieke proces waarmee emissiehandelssystemen worden ontwikkeld, in combinatie met politiek-economische omstandigheden die per rechtsgebied verschillen, heeft geleid tot een heterogene verzameling systemen met verschillende of zelfs tegenstrijdige beleidsprioriteiten. Of koppeling van handelssystemen er in de praktijk toe leidt dat de totale emissiereductietargets van de gekoppelde rechtsgebieden kosteneffectief worden behaald, is in belangrijke mate afhankelijk van hoe de afzonderlijke systemen zijn opgezet. Daarom moet elke koppeling van handelssystemen afzonderlijk op welvaartseffecten worden geanalyseerd.

In deze dissertatie wordt via een juridisch-economische benadering geanalyseerd of en hoe de koppeling van emissiehandelssystemen de welvaart beïnvloedt. Dit gebeurt aan de hand van bestaande systemen. Het onderzoek richt zich op vier aandachtsgebieden: systemen van kosteloze toewijzing, compensatieregelingen, maatregelen voor marktstabilisatie en politieke duurzaamheid. Het effect dat elk van deze aandachtsgebieden (met uitzondering van compensatieregelingen) heeft op de economische doelmatigheid alsook de effectiviteit van reductiemaatregelen worden beoordeeld in een scenario waarin twee van de volgende systemen bilateraal worden gekoppeld: het European Union Emissions Trading System (EU ETS), het Australische Carbon Pricing Mechanism (CPM) en het Zuid-Koreaanse ETS. De analyse van compensatieregelingen is gebaseerd op een beoordeling van het compensatiebeleid binnen belangrijke huidige emissiehandelssystemen. In de analyse worden vooral de economische doelmatigheid en de effectiviteit van emissiereductie van het koppelen van handelssystemen beoordeeld, maar ook de gevolgen die de koppeling heeft voor de politieke prioriteitstelling in de relevante rechtsgebieden.

Uit de analyse blijkt hoe en waarom de opzet van gekoppelde systemen invloed heeft op de gevolgen van koppeling van die systemen, zowel wat betreft economische doelmatigheid als effectiviteit van de emissiereductie. Zo blijkt dat bedrijven door de regelingen van kosteloze toewijzing in het Australische CPM en de EU ETS in een bilaterale koppeling worden ontmoedigd om hun emissiereductie over te hevelen naar het stelsel dat de laagste reductiekosten biedt. Ook kan het Australische CPM, waarin het aantal emissierechten dat een onderneming kosteloos ontvangt wordt gekoppeld aan onder meer het productieniveau van dat bedrijf in een verplichtingsperiode, leiden tot hogere totale emissiewaarden dan in de periode voorafgaand aan de koppeling, wat de effectiviteit van de emissiereductie ondermijnt. Op vergelijkbare wijze worden zowel de economische doelmatigheid als de effectiviteit van de emissiereductie mogelijk nadelig beïnvloed door de verschillende maatregelen voor marktstabilisatie van het EU ETS en het Koreaanse ETS.

Daarnaast laat de analyse zien welke kosten en problemen zich aandienen zodra in de context van gekoppelde koolstofmarkten andere beleidsdoelen dan economische doelmatigheid en effectiviteit van de emissiereductie in ogenschouw worden genomen. Het verbod van het EU ETS op gecertificeerde emissiereducties (CER's) uit "credits" van landen die niet tot de minst ontwikkelde landen (LDC's) behoren ondersteunt de inspanningen op het gebied van duurzame ontwikkeling van LDC's, doordat fondsen van meer ontwikkelde landen worden doorgegeven aan LDC's. Dit verstoort echter het prijsmechanisme van de toewijzing van emissiereducties aan elke willekeurige onderneming die dat tegen de laagst mogelijke reductiekosten kan realiseren. Dit heeft op zijn beurt een nadelige invloed op de kosteneffectiviteit van de handelssystemen. Bovendien kan de koppeling van handelssystemen beleidsprioriteiten van de gekoppelde rechtsgebieden ondermijnen. De koppeling tussen het Australische CPM en het EU ETS leidde bijvoorbeeld tot een scherpe daling van de verwachte koolstofprijs van het CPM voor 2015, waardoor vervolgens het relatief hoge prijssignaal voor de koolstofprijs van het CPM erodeerde. Dit ondermijnde het Australische doel om investeringen voor lagere koolstofuitstoot op lange termijn te stimuleren.

In de toekomst zal koppeling van emissiehandelssystemen waarschijnlijk uitgroeien tot een zeer belangrijke factor in de internationale samenwerking bij de strijd tegen klimaatverandering. Het is echter twijfelachtig of dit bottom-up-proces een daadwerkelijk wereldwijde koolstofmarkt zal opleveren. Bestaande koppelingen duiden op een trend richting regionalisme, waarbij handelssystemen in vergelijkbare geografische gebieden worden samengevoegd tot één koolstofmarkt. Hoewel de opkomst van regionale handelssystemen kan worden beschouwd als een eerste stap naar de ontwikkeling van een daadwerkelijk wereldwijde koolstofmarkt, is er geen garantie dat multilaterale koppelingen zullen ontstaan als gevolg van deze regionalisering. Het is heel goed mogelijk dat binnen regionaal geclusterde handelssystemen idiosyncratische institutionele structuren en beheersstructuren zich zullen ontwikkelen die verdere koppeling van meerdere regionale systemen bemoeilijken. Dit laatste vooruitzicht vormt een intellectuele en politieke uitdaging: er moeten dan manieren worden gevonden om regionaal geclusterde handelssystemen multilateraal te koppelen.